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Functions of Autobiographical Memory in Single and Recurring Events: Relations to
Well-being

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By: Theodore E. A. Waters

A growing body of literature suggests that autobiographical memory serves three basic functions: self definition, fostering social relationships, and directing future behavior. Further, some research suggests that the functions a memory serves is influenced by the type of event recalled (Waters et al., *submitted*). Although some research has demonstrated that autobiographical memories do serve these three functions, to date, there has been no investigation into the potential relations between the functions of autobiographical memory and actual functioning (*i.e.* psychological well-being). To address this gap in the literature, I present three papers drawn from the same data collection. 103 undergraduate students provided four personally significant autobiographical narratives (two single and two recurring events), and completed a set of questionnaires measuring memory function and psychological well-being. Memory functions were also assessed through narrative coding. Major findings include: that single events served more of a self and directive function compared to recurring events, while recurring events served more of a social function (Paper 1); that individuals who used their autobiographical memories to serve high levels of the self, social, and directive functions (measured via questionnaire) reported higher levels of Purpose and Communion and Positive Relationships (Paper 2); and that the ability to construct coherent autobiographical narratives was related to psychological well-being, and that this relation was moderated by the self function, for Purpose and Communion (Paper 3). The results provided the first evidence that individuals who use their memories to serve the self, social, and directive function of autobiographical memory report higher levels of psychological well-being, and replicated previous work suggesting that event type influences the expression of the functions of autobiographical memory.

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Functions of Autobiographical Memory in Single and Recurring Events:

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Abstract

A growing body of literature suggests that autobiographical memory serves three basic functions: self definition, fostering social relationships, and directing future behavior. Further, some research suggests that the functions a memory serves is influenced by the type of event recalled (Waters et al., *submitted*). Although some research has demonstrated that autobiographical memories do serve these three functions, to date, there has been no investigation into the potential relations between the functions of autobiographical memory and actual functioning (*i.e.* psychological well-being). To address this gap in the literature, I present three papers drawn from the same data collection. 103 undergraduate students provided four personally significant autobiographical narratives (two single and two recurring events), and completed a set of questionnaires measuring memory function and psychological well-being. Memory functions were also assessed through narrative coding. Major findings include: that single events served more of a self and directive function compared to recurring events, while recurring events served more of a social function (Paper 1); that individuals who used their autobiographical memories to serve high levels of the self, social, and directive functions (measured via questionnaire) reported higher levels of Purpose and Communion and Positive Relationships (Paper 2); and that the ability to construct coherent autobiographical narratives was related to psychological well-being, and that this relation was moderated by the self function, for Purpose and Communion (Paper 3). The results provided the first evidence that individuals who use their memories to serve the self, social, and directive function of autobiographical memory report higher levels of psychological well-being, and replicated previous work suggesting that event type influences the expression of the functions of autobiographical memory.

Functions of Autobiographical Memory in Single and Recurring Events:

Relations to Well-being

As early as 1932, Fredrick Bartlett criticized the strategy of focusing memory research on simple, often meaningless, materials. Nonetheless, this strategy persisted until Neisser's (1982) work on autobiographical memory, and Bruner's (1991) discussions of narrative as a distinct mode of thought. Both called attention to more complex and personally meaningful materials, and led to a substantial body of research which examined how laboratory observations translated to a more ecological context. More recent theorizing has expanded these questions to address the basic functions of autobiographical memory. In general, theorists have argued that autobiographical memory serves three basic functions; self definition, social connection, and direction of future behavior (Pillemer, 2003; Bluck, Alea, Habermas & Rubin, 2005). The integration of structure and function led psychologists to develop new theories of memory that link memory and self through time (*e.g.* Conway & Pleydell-Pearce, 2000). More specifically, research has begun to examine the relation between personally significant event memories and personality development, identity construction, and well-being (*e.g.*, Fivush & Hudson, 1990; Pillemer, 2003; McAdams, 1993, Baerger & McAdams, 1999).

Currently, most studies that examine relations between personally significant autobiographical memories and well-being focus on single, usually unique, events (an event taking place in a 24-hour period). Yet, as discussed in more detail below, autobiographical memory is comprised of multiple types of events. More specifically, Waters, Bauer, and Fivush (*submitted*) suggest that recurring events play an important role, not only in the structure of autobiographical memory, but also in the functions it

serves. They found that recurring event memories were not only structured differently than single event memories, they also served a greater social function, while single event memories served more of a self function. These findings suggested that narrative structure and function may be linked in systematic ways, and open the possibility that function may be differentially related to well-being.

I will begin with a basic description of autobiographical memory research followed by an account of one of the most widely accepted models of autobiographical memory, the Self-Memory-System (SMS model; Conway & Pleydell-Pearce, 2000) model. Next, I will provide a review of the research examining the functions of autobiographical memory. I then turn my attention to a review of the relevant research on single and recurring event memory, and how these ideas can be integrated into a more comprehensive model of autobiographical memory. Finally, I will review the literature demonstrating relations between autobiographical memory and well-being.

Autobiographical Memory

Larson (1991) defined autobiographical memory as memory of personal experiences embedded in the context of one's life. Within that broad category of memory, Brewer (1988) outlined four potential basic classes of autobiographical memory; personal memory, autobiographical facts, generic personal memory, and a self-schema. Personal memories describe unique single events, or experiences, in one's life. They often prompt a feeling of reliving the experience during recollection, including strong visual and affective components. Autobiographical facts are declarative fragments typically reported without accompanying mental imagery (*e.g.* the date of your birth). Generic personal memories contain information from a repeated set of similar

experiences (recurring events). Brewer suggested that because these memories consist of a combination of multiple similar experiences, they lack the element of uniqueness attributed to personal memories. Last of all, the self-schema contains a large body of generic autobiographical information, and provides an integrated set of beliefs about one's self (*e.g.* "I enjoy going to the movies with friends"). Brewer (1988) provided a necessary description of what autobiographical memory is the memory of.

Autobiographical memory is not simply a list of facts, or an unconnected series of unique personally meaningful episodes, but it is instead a broad set of specific, and generic, facts and experiences with varying levels of vividness derived from both unique, and recurring, personal experiences. Beyond the basic contents of autobiographical memory, Conway and Pleydell-Pearce (2000) proposed a model of the basic structure and organization of the contents of autobiographical memory.

The SMS Model

The SMS model proposed by Conway and Pleydell-Pearce (2000) is a widely accepted model of the broad structure and organization of autobiographical memory. The SMS model identifies two key systems in the dynamic process of autobiographical memory construction: the working self, and the autobiographical knowledge base. The working self refers to a sub-set of working memory, primarily dealing with goals (formation, maintenance, and implementation). The working self serves to constrain cognition and shape behaviors relevant to motivated action.

In the SMS model, the autobiographical knowledge base (AKB) consists of a hierarchical organization of self relevant knowledge that parallels Brewer's (1988) description of the types of autobiographical memories. Conway and Pleydell-Pearce's

(2000) hierarchy consisted of three levels of autobiographical memory organization: lifetime periods, general events, and event specific knowledge (Figure 1). The highest level of the AKB is the lifetime periods level. Here, autobiographical memories were organized into thematically consistent, temporally organized chunks. An example of a thematic link would be “romantic relationships”, and a temporally organized lifetime period fitting with that theme would be “my marriage to X”. Other themes would include work, or education. Below this level of organization sits the general events level. General events are organized specific, or generalized, episodes in autobiographical memory (*e.g.* “First meeting – The Dance”).

These episodes are generally viewed as being organized around goal pursuit or attainment (*i.e.* shaped by the working self). Multiple memories from the general events level would comprise a lifetime period. Event specific knowledge (ESK), the lowest level of the hierarchy, referred to the specific details making up autobiographical memories, or general events. ESK consists of the specific sensory-perceptual details held in the AKB that are integrated over time into general event memories, and eventually included under the umbrella of a lifetime period.

Though the AKB and the working self exist independently of each other, their interaction is what creates the emergent self, and the SMS. The knowledge we have about ourselves constrains the kinds of goals and pursuits we can legitimately maintain, and therefore constrains the working self. The goals of the working self then shape what kinds of ESK are brought into the general events level, and integrated into an autobiographical memory. The SMS model proposed that goal achievement, failure, or change, defines what is encoded into the ESK level, and later used to form and retrieve

memories at the general events level. The working self shapes our construction of, and reaction to, memories at the general events level during recall, and allows us to create/identify themes that link general events to form lifetime periods.

Memory Construction and Retrieval

The SMS model proposed that the AKB and the working-self interact to shape encoding, consolidation, and retrieval of memories. The model also outlined two ways that autobiographical memories could be generated by the SMS: generative retrieval, or direct retrieval (Conway & Pleydell-Pearce, 2000).

Generative retrieval occurs during intentional recollection of autobiographical memories and is comprised of several stages (Conway & Pleydell-Pearce, 2000). The pre-stages involve the elaboration of a cue (typically at the ESK level), and construction of an online model of verification criterion for knowledge in the AKB. Once the pre-stages are complete, a search through the AKB occurs, and a memory is formed. The important distinction is that the recalled memory does not exist as a stable representation, but as an emergent one. The verification model constructed by the working self determines what ESK is recalled, and thus what shape the constructed memory takes. This verification model is analogous to a set of relevant schemas, or scripts, and draws upon a large area of memory research demonstrating the effects of schemas and scripts on autobiographical memory retrieval and construction (see Brewer, 1986 for a review).

Direct retrieval refers to more spontaneous recall. There is no search or verification criterion set. Instead, activation of ESK causes the corresponding general events (already constructed memories) to become activated. When this activation links with a current goal of the working self, a direct retrieval of an autobiographical memory occurs.

Importantly, in direct retrieval the goals determined by the working self operate after memory construction occurs.

The Long-Term Self, a New Addition to the SMS

Though the hierarchy of the AKB described by Conway and Pleydell-Pearce (2000) provided a broad descriptive model of autobiographical memory, the model failed to account for a more overarching level of autobiographical knowledge organization. In a revision of the SMS model, Conway, Singer, and Tagini (2004) reconstructed the AKB and the working self to include the long-term self. The working self represents the online cognitive functioning related to goal pursuit. The long-term self contains the conceptual self and the AKB. The conceptual self incorporates self-relevant schemas such as personal scripts, internal working models of social interaction (*e.g.* attachment representation), possible selves, attitudes, values, and beliefs. These components are drawn from experiences with family, peers, educational and religious institutions, and culture more generally. The conceptual self contains a broader, and more abstract, set of components in comparison to the working self. The conceptual self derives these abstract representations through accumulated, and likely recurring, experiences during socialization.

Conway et al. (2004) reframed the AKB to include a higher level of abstraction in the form of the life story schema. The life story schema contains information about the individual's life story, or personal myth (McAdams, 1993), and normative information about how a life story is constructed within a particular culture (Habermas & Bluck, 2000; Berntsen & Rubin, 2004). The life story schema “draws on social cognitive conventions with regard to temporal order, dominant themes, causal attributions, and

evaluative stances toward experience” (pp. 499, Conway et al., 2004).

Together, the addition of the conceptual self and life story schema form the long-term self. The long-term self incorporates a broader range of relevant experiences in determining how autobiographical memories are constructed and stored, and how they may function in everyday life. The working self maintains its role in autobiographical memory formation and reconstruction, and the long-term self helps account for cultural and social influences on goals, values, principles of narrative construction, expectations, and themes.

Though a degree of recurring experience was included in the SMS model, the major focus was still on goal related single event memories. However, as some evidence suggests (*e.g.* Waters et al., *submitted*), recurring event memories may be associated with, or constructed with, different goals in mind compared to single events, mainly social/relational goals. Though a theoretical account of potential differences in autobiographical memory for single events and recurring events exists, little research has examined how these differences relate to the goals, or functions, these memories may come to serve.

Event Type

The majority of research on autobiographical memory specifically elicits single episodes, but when individuals are asked to freely recall events from their lives, other types of events are equally prevalent. For example, Barsalou (1988) collected data from undergraduate students returning to school from summer vacation. Students were asked to describe what they did over the summer in the order that the events came to mind for five minutes. After the statements made were analyzed, results showed that

undergraduate students were producing specific, single event related statements only about twenty percent of the time. Thirty percent of the statements were summaries of recurring events (*e.g.* “I played a lot of softball”), another thirty percent of the statements described general aspects of the events (*e.g.* “the house we rented was beautiful”), and nine percent of the statements referenced an extended event (*e.g.* “I went to San Francisco for two weeks”). In a second study, Barsalou (1988) again recruited undergraduate students at the start of the fall semester and asked about their summer vacations. The participants were required to recall information about their summer vacations during three sessions, which were each two weeks apart. There were four conditions in the first session. Participants were asked to provide a list of as many of one of the following; people you spent time with, places you went, activities you did, or times when things happened. When the participants returned two weeks later, they were given each item from the list they produced as cues, and asked to retrieve as many related memories as possible based on the cues. In the final visit, participants were asked to categorize each event they recalled as either a specific event, or a recurring event. About sixty percent of all the recalled memories were recurring events. These results suggested that, though single events account for a significant proportion of autobiographical memories in both cued and free recall conditions, recurring events are also an important part of representations of the personal past.

Functions of Autobiographical Memory

In recent decades, a more functional approach to research on autobiographical memory emerged, prompted by calls for a more ecological perspective. To answer Baddeley’s (1988) now famous question to autobiographical memory researchers, “but

what the hell is it for?”, three answers have emerged: (1) self definition and continuity; (2) creating, maintaining, and representing social connections; (3) directing future behavior. Though there may be other potential functions of autobiographical memory, it is widely agreed that autobiographical memory serves at least these three functions (Pillemer, 2009).

There has been sparse research on the functions of autobiographical memory, and again, this research has focused on single events. There are some suggestions in the literature that single and recurring event memories may be differentially related to function. However, it is important to emphasize that any given event memory can serve multiple functions (Waters et al., *submitted*).

Single Events/Self Defining Memories

Personally significant specific single events, often called self defining memories, receive the majority of the theoretical and empirical attention of autobiographical memory researchers (but see Nelson, 1986). Participants in autobiographical memory research are typically asked to produce several specific personally significant events, which occurred at a specific time and place, in as much detail as possible. In the SMS, self defining memories are constructed through the interaction of the goals of the working self and the AKB (Conway & Pleydell-Pearce, 2000). With self defining memories the conceptual self plays an important role, that it may not in less significant memories at the general events level. Self defining memories are described as “particularly powerful integrations of personal scripts within the conceptual self and knowledge within the AKB that is linked thematically to these scripts” (pp. 507, Conway et al., 2004). Scripts and other generalized representations from the conceptual self, set constraints on the event

sequence/meaning that is constructed from the AKB. The current goals of the working self determine what ESK is accessed during the formation of self defining memories.

McAdams (1995) model of adult personality also outlined a strong link between single events, and the self function of autobiographical memory. McAdams (1995) described three levels that comprise adult personality. The lowest level consisted of “traits” (Big Five, *etc.*), level two “Characteristic Adaptations”, included goals, motivations, working models, and scripts. The third level “Identity and Life Stories”, contained self defining memories (single events) woven together into a narrative identity. In McAdams’s view, autobiographical narratives are constructed and combined to form a stable identity during early adulthood.

Other theorists have focused more on the social and directive functions of self defining memories. Pillemer (2003) argued that personally significant single events also serve an important directive function, in that they serve as salient reminders of lessons learned through experience. Thorne, McLean, and Lawrence (2004) examined three self defining memories from 168 adolescents. These narratives were coded for type (relationship, mortality, achievement, and leisure), meaning-making (either learning a lesson, or deriving some insight about the self, or world), and if the memories had ever been told (social function). Major findings included that in about one quarter of the adolescent narratives, direct references to lessons, or insights, were made. Further, the likelihood of references to meaning did not depend on whether the memories were shared with others, or not. This suggested that meaning-making was independent of the social function, though the vast majority of the memories had been shared at least once. This finding suggested that self defining memories may also serve a social function. Though

some research has investigated the multiple functions of single/self defining memories, recurring event memories are often ignored, or thought to perform strictly directive functions, and contribute little to social or self functions.

Scripts

Though originally described with the development of artificial intelligence in mind, Schank and Abelson's (1977) script concept fits well with research on recurring experiences and autobiographical memory. Schank and Abelson (1977) described a script as a cognitive structure (a form of schema) that contains temporal causal information about a recurring class of personally experienced events. Scripts contain a linked bundle of expectations that guide cognition during processing of events and inference formation (Abelson, 1981). A common example of a script is the "restaurant script". This script contains several scenes, the order of which is specified by generalized experiences of going to restaurants. The first scene involves being seated, the next reading the menu, and ordering, and so on.

Evidence to support the existence of scripts includes research on "gap filling". Gap filling refers to the tendency of individuals to use scripted representations to fill in gaps, or smooth over inconsistencies, in recalled experiences, or to falsely recall script related details that did not occur (Graesser, Woll, Kowalski & Smith, 1980). Scripts have also been shown to reorder events experienced out of their typical sequence (Abelson, 1981). The general findings on the organizing power of scripts describes the influence recurring experiences can have on memory. It is suggested in the developmental literature that scripts are an early developing form of event memory that serve, primarily, a directive function (Nelson, 1986;1988). But these findings have prompted little autobiographical

memory research investigating recurring events, and their relation with the three basic functions of autobiographical memory in more detail.

Functions by Event Type

Based on the literature, as reviewed above, there are several reasons to expect function to differ by event type. The self function is often associated with personally significant single events (*e.g.* self defining memories) because these events tend to be highly emotional, and related to dramatic changes in personal circumstance. Recurring events, however, are likely to be more representative of stability, rather than change. Therefore, recurring events may be more representative of stable enduring social relationships (social function), rather than of dramatic changes in self concept or circumstance (self function). Arguments for both single and recurring events serving a directive function exist in the literature (*e.g.* Pillemer, 2003; Nelson, 1986), and currently there is data to support both claims.

In an initial study, Waters et al. (submitted) compared the functions and narrative structure of single, recurring, and extended events. I will only discuss the findings comparing single and recurring events as they are the focus of this dissertation. Narratives and questionnaires collected from 52 undergraduate students were coded on expression of self, social, and directive functions, as well as on multiple narrative variables including three dimensions of coherence (theme, context, and chronology), pronoun use, and verb tense. Single events were more thematically coherent, contained more of the pronoun “I”, had more past tense verbs, and served more of a self and directive function than recurring events. Recurring events contained more of the pronoun

“we”, more present and future tense verbs, and served more of a social function than single events.

That single events were thematically coherent, told in the singular personal past, and were both implicitly self-defining in narrative theme and explicitly self-defining in the questionnaire measure, confirmed previous research on self defining memories (*e.g.* Singer & Blagov, 2004). That they were also high on directive function fit with Pillemer’s (2003) argument for the directive power of single unique events. However, single events were low on social function for both the narrative, and questionnaire measures compared to the other event types. This suggests that events occurring at one point in time may not bond us to others to the same extent as events that are more extended in time.

In contrast, recurring events were high in social function, and implicitly included a more shared sense of experience through the use of the pronoun “we”. Recurring events contained more content related to the social function, compared to self or directive functions. This suggested that recurring events facilitate the development and maintenance of social relationships. Recurring events were also told in the timeless present and future tense to a greater extent than the single events. This indicated that these are ongoing events that bond self to others through time. The higher level of present and future tense use might also suggest a more directive function, as has been argued in the script literature (Nelson, 1986). Surprisingly, this function was not apparent in the other directive function scores from either the narrative coding or the questionnaire measure. This may, in part, be explained by the generalizability of personal versus cultural scripts. Recurring events may lead to the formation of personal

scripts, but these may be different from the scripts described by Schank and Abelson (1977). Whereas Schank and Abelson's scripts are generalizable across events in a recurring class of culturally shared experiences (going to a restaurant), personal scripts may be too specific to serve a directive function. Findings from this initial study established that single and recurring events were not equal, and suggested that they may be related to different domains of experience. But the question remains, are the functions of autobiographical memory related to functioning (*i.e.* well-being) in any predictable or systematic way.

Autobiographical Memory and Well-Being

Research examining relations between autobiographical memory and psychological well-being generally finds positive relations between the two constructs. A variety of variables scored from autobiographical narratives have been used to index the extent to which individuals engage in "meaning-making", and how meaning-making is related to well-being. Although there is no fully agreed upon definition of narrative meaning-making, the literature suggests that meaning-making within autobiographical narratives is accomplished through several means. Specifically, through the creation of more coherent narratives (Reese, Haden, Baker-Ward, Bauer, Fivush, & Ornstein, 2011), the use of internal states language describing thoughts and emotions (Fivush & Baker-Ward, 2005; Pennebaker & Chung, 2011), and through reflection on lessons learned about the self and the world (McLean & Pratt, 2006; see Fivush, Bohanek, Zaman, & Grapin, *in press*, for a full discussion). Research has demonstrated that these aspects of meaning-making relate to better self reported psychological well-being. Research has examined a wide variety of event categories, and their relations to well-being, using a variety of methodologies

including narrations of specific negative or positive event memories, interviews asking for full life stories, and experiments asking for repeated written narratives of traumatic experiences. I will discuss links between autobiographical memory, meaning-making, and well-being from each of these domains of research respectively.

Studies examining single event narratives typically find that higher levels of meaning-making, in the form of internal state language, corresponds with higher scores on measures of psychological well-being (Bohanek & Fivush, 2010). In children, Sales, Fivush, Parker, and Bahrick (2005) found that more internal states language in narrative descriptions of a severe and frightening hurricane were related to lower levels of posttraumatic stress in a follow-up assessment. In adolescents, Bohanek (2006) found that expression and explanation of emotion in autobiographical narratives of positive events were related to higher levels of psychological well-being. Bohanek and Fivush (2010) found that male adolescents' internal state language, in both positive and negative autobiographical narratives, was related to better psychological well-being. However, no relations were found for adolescent girls.

Beyond studying single events, researchers have also examined "life story" narratives, or meaning-making in multiple significant events (*e.g.* high point, low point, turning point). At the level of the life story, meaning-making is often discussed in terms of subjective themes such as redemption, contamination, and personal growth. In general, individuals who tell life stories with more themes of redemption (negative experiences turning out positively), self report higher levels of life satisfaction (Bauer, McAdams, & Sakaeda, 2005). Participants who tell life stories with more contamination themes (good things go bad, and stay bad), show higher levels of depression and lower

self-esteem (Adler, Kissel, & McAdams, 2006). Individuals who tell life narratives with more themes of growth and change exhibit higher levels of ego development (Pals, 2006). Beyond themes of redemption, contamination, and growth, Baerger and McAdams (1999) found that individuals with more coherent life stories were less depressed and had higher satisfaction with life.

The most consistent and heavily researched area relating autobiographical memory, and meaning-making, to well-being comes from Pennebaker's expressive writing paradigm (see, Pennebaker & Chung, 2011, for an overview). The expressive writing paradigm consists of random assignment of participants to one of two groups, the expressive writing group or the control. Once individuals are assigned to a group, participants fill out a wide variety of mental health questionnaires for depression, anxiety, posttraumatic stress, *etc.* Following the initial assessment phase, participants are asked to write about either a traumatic/stressful event (expressive writing group), or a mundane topic like a recent meal, for 20 minutes a day, for 3-4 days. Immediately following the writing portion of the paradigm, participants complete the same set of questionnaires, and are followed up with again several weeks or months later.

Participants in the expressive writing group show significant benefits, in comparison to their control group counterparts, on a wide variety of physical and mental health outcome measures (Pennebaker & Chung, 2011). Compared to controls, participants from the expressive writing group report numerous positive physical health outcomes including fewer doctor visits (Harris, 2006), less fatigue (Danoff-Burg, Agee, Romanoff, Kremer, & Strosber, 2006), and improved immune system functioning (Pennebaker, Kiecolt-Glaser, & Glaser, 1988). Psychological benefits from expressive writing include,

reduced levels of depression (Graf, Gaudiano, & Geller, 2008), anxiety (Graf et al., 2008), and improvements in coping with loss (Range, Kovac, & Marion, 2000).

A variety of specific narrative variables have been examined in the expressive writing paradigm, and their benefits to well-being. For example, individuals who provide more positive emotion words in their narratives demonstrate more positive health benefits from expressive writing (Pennebaker & Chung, 2011). Unlike the linear relations between well-being and positive emotion word usage, negative emotion words use is curvilinearly related to well-being. Participants with moderate use of negative emotion words receive the most benefit in expressive writing studies, compared to those who use few, or many, negative emotion words (Pennebaker & Chung, 2011). Increases in insight and causal words (thought to index coherence) in autobiographical narratives of trauma across writing days show the greatest health benefits, though individuals who start out with high levels of insight and causal words do not benefit from expressive writing (Boals & Klein, 2005). This suggests that a more cognitive understanding of negative experiences may contribute to the health benefits associated with expressive writing. That said, gender differences in the benefits of expressive writing have been observed, with males generally benefiting more than females (Range & Jenkins, 2010).

Some have attempted to explain findings from the expressive writing literature as resulting from habituation to the negative components of the autobiographical event over repeated writing (Sloan, Marx, & Epstein, 2005). That said, mere exposure has failed to explain away the majority of the positive benefits associated with expressive writing (Pennebaker & Chung, 2011).

Autobiographical Memory and Eudaimonic Well-Being

The research reviewed above suggests that something about quality, style, or meaning contained within autobiographical narratives of personally significant events predicts “well-being”. Defining what is meant by well-being is an extremely difficult task. Recently, researchers have begun to challenge traditional hedonic models of well-being that attempt to quantify positive affect, instead emphasizing a model of “eudaimonic” well-being. The eudaimonic model of well-being (*e.g.* Bauer, McAdams, & Pals, 2008; Keyes & Magyar-Moe, 2003) focuses more on one’s sense of purpose, meaning, and functioning, and less on positive affect (Keyes, 1998; Keyes & Magyar-Moe, 2003; Ryan & Deci, 2001; Ryff & Singer, 1998). Keyes and Magyar-Moe (2003) discuss their model of eudaimonic well-being in terms of two global dimensions, psychological well-being and social well-being. Psychological well-being is focused more on the individual, what you think/feel about yourself (*e.g.* self-acceptance or autonomy). The social well-being dimension focused more on relationships, what you think/feel about social relationships and how you function within them (*e.g.* social acceptance).

Memory Function and Well-being

Researchers have long argued that a variety of features of autobiographical memories facilitate adaptive behavior and development, though as described above this tends to focus on a broadly defined concept of meaning-making. This makes it difficult to generate specific predictions about relations between meaning-making and well-being. However, if the functions of autobiographical memory are used to organize the types of meaning-making being measured, specific predictions are more easily generated.

In terms of the self function, McAdams (1985; 1993; 1996) argued that we use autobiographical memories to construct our identities, a critical developmental task and

an important feature of psychological adjustment. The creation of an identity facilitates a sense of purpose and meaning across time. In terms of the social function, Nelson (1993) suggested that autobiographical memory is adaptive in that it creates a supportive social network facilitating emotional, psychological, and material support. These aspects of social relationships all likely contribute to increased psychological well-being (see also Pillemer, 1998). In terms of the directive function, Brown and Kulik (1977) suggested that memories for emotional and personally significant events may be valuable as they likely inform future behavior (directive function; see Pillemer, 2003 for full discussion). The ability to navigate difficult emotional conflicts and resolve problems more effectively has strong implications for positive self perception (a critical feature of several models of psychological well-being; see Keyes & Magyar-Moe, 2003 for full discussion). Along these lines, I argue that individuals who use their memories to serve self, social, and/or directive functions may also experience higher levels of psychological well-being in terms of: a sense of purpose and meaning, positive relationships and support, and positive self perception.

To summarize, autobiographical memory involves a complex interaction between event memory and the kinds of goals, or meaning, represented by/attached to those events. It also seems that both the quantity and quality of the meaning relates to psychological well-being. However, there are several gaps in the current literature. First is the omission of recurring events from research on autobiographical memory. The little research that exists on these types of events suggests that there may indeed be systematic differences in both the patterns of meaning attributed to these events, and the relations between that meaning and psychological well-being. Secondly, the current research

examining relations between autobiographical memory and well-being does not take into account the functions an autobiographical memory may serve, and how this may influence its relations to well-being. Third, psychological well-being is typically operationalized in terms of the hedonic tradition, while emerging literature suggests that including eudaimonic features of well-being may better capture what is meant by the term psychological well-being (Keyes & Magyar-Moe, 2003).

The Current Research

The papers presented below aim to build upon the research reviewed above in several ways. Although the literature on the relations between autobiographical memory and well-being has produced convincing evidence of a relation, there are problems that still need to be addressed. First, the event type that individuals are asked to recall is rarely specified in autobiographical memory research. Further, the event type actually produced is rarely examined. Waters et al. (*submitted*) argued that single and recurring events convey different types of information about the individual and the world. This difference may be reflected in the organization and functions served by single and recurring events, as well as the pattern of relations between autobiographical memory/narrative and well-being. Specifically, single events are well suited to convey information about milestones, achievements, and change. Single events also provide useful material for quick comparisons between self and other, while recurring events provide more generalizable information about how the world works, and how relationships develop. Secondly, it is not clear whether the function an autobiographical memory serves has an impact on psychological well-being. For example, as McAdams (*e.g.* 1993) has argued, using autobiographical narratives for self understanding may contribute to the development of a

sense of purpose and meaning to one's life. To date, the research on the functions of autobiographical memory has not examined the possible relations between the function a memory serves and psychological well-being. Finally, while some research suggests that meaning-making constructs are related to psychological well-being, there has been no investigation of the potential effect of the functions of autobiographical memory on the relation between meaning-making (*i.e.* narrative coherence) and well-being.

I aimed to address the major issues outlined above by collecting single and recurring event narratives along with a large set of psychological well-being measures, assessing both hedonic and eudaimonic conceptions of well-being. Further, I assessed the autobiographical memory functions served by each event memory in two ways, narrative coding and self report questionnaire. The specific motivations, methods, and predictions for each paper are discussed in turn.

Paper 1

In preliminary work examining the structure and functions served by multiple event types, Waters et al. (*submitted*) found that single events served more of a self and directive function, were more thematically coherent, set in the past, and told from a first person singular perspective. In contrast, recurring events served more of a social function, were set in the timeless present and future, and were told from the first person plural perspective. These findings suggested that both the content and structure of narratives provide information about function, and that different types of events may serve different functions. Because this was the first study to assess the functions of autobiographical memory, using both questionnaire and narrative measures, it is in need of replication and extension. Thus, the major objective of the first paper presented in this

dissertation was to replicate and extend Waters et al. (*submitted*) in order to verify their findings and examine additional issues regarding functions of single and recurring autobiographical events. A secondary objective of this research was to further develop and validate narrative and questionnaire measures of function, to provide useful and reliable tools for future research.

Based on research on self-defining events (*e.g.* Blagov & Singer, 2004) and scripts (Schank, 1999; Schank & Abelson, 1977), I assumed that the functions would be reflected in narratives not only by content but by linguistic features. More specifically, I aimed to replicate and extend Waters et al. (*submitted*) by expanding measures of narrative structure (*e.g.* coherence) and perspective taking beyond verb tense and pronoun use. I included language reflecting subjective perspective and internal states, as these linguistic features may also reflect the functions a memory serves. I operationalized the self function as personal pronoun and past tense verb use, internal state language indicating a personal perspective that places the self at the center of the event, and predicted that this would be more frequent in single, than in recurring, events. In contrast, plural pronoun and social processing words would be more indicative of the social function, and would be more prevalent in recurring events. Finally, present and future tense verbs, as well as spatio-temporal terms, may reflect the directive function. Events maybe projected into the timeless present and future, and include information about the temporal and spatial unfolding of actions and behaviors, to better serve the directive function. It was not clear whether this would be more prevalent in single (as predicted by Pillemer, 2003) or recurring events (as predicted by script theory). In addition, Waters et al. (*submitted*) assessed the social and directive functions with a

single open-ended question which reliability statistics could not be calculated on; thus a secondary aim was to develop reliable multidimensional rating scales for these functions.

Based on previous research, I expected that narratives of single and recurring events would differ in structure and organization in several ways. I expected that single events would be more thematically and contextually coherent, as recurring events have been proposed to be more schematic, action focused, and abstract. In contrast, recurring events may be more chronologically coherent, as scripts contain substantial temporal information (Waters et al., *submitted*). I expected that the self function, broadly defined, would be higher for single events than recurring events. This includes a significantly higher proportion of the pronoun “I”, past tense verb use, internal states language, and higher questionnaire and narrative measures of the self function. I predicted that the social function would be higher for recurring events compared to single events. Specifically, I predicted that recurring events would contain more first person plural pronouns and social processing terms, as well as higher levels of the social function (questionnaire and narrative measures). Based on the previous literature discussed above, I hesitated to make specific predictions for the directive function. Waters et al. (*submitted*) suggested that single events serve a more directive function compared to recurring events. So I tentatively predicted that recurring events would contain higher proportions of present and future tense verbs and spatio-temporal terms, as well as higher scores on questionnaire and narrative assessments of the directive function. I also predicted that the narrative and questionnaire measures of each function would be significantly correlated.

Paper 2

A wide range of research, using a variety of paradigms, has found links between autobiographical memory constructs and psychological well-being. For example, more expression and explanation of emotion in autobiographical narratives of positive events was related to higher levels of psychological well-being in a sample of adolescents (Bohanek, 2006). McLean and Pratt (2006) found that more sophisticated meaning-making, defined as connecting the memory to an understanding of self, was related to identity maturity, generativity, and optimism. Baerger and McAdams (1999) found that the life story narrative coherence was positively correlated with life satisfaction and negatively correlated with depression. Despite fairly convincing results, work linking autobiographical memory variables to psychological well-being has not taken a fully functional approach. Further, this research has neglected to examine relations to well-being in multiple event types (*i.e.* recurring). I argue that the extent to which individuals use their memories to serve self, social, and directive functions may too result in relations to psychological well-being, and that these relations may differ depending on the event type used to serve each function.

The overall objectives of the second paper were to examine the relations between psychological well-being and functions served by single and recurring events. I conducted a series of correlational analyses examining relations between questionnaire measures of each function and three factors of psychological well-being. Based on McAdams' (*e.g.* 1993; 1996) arguments about the importance of autobiographical memory in creating a sense of purpose and meaning in life, I predicted that individuals who used their memories for more of a self function would report higher well-being scores on a factor reflecting a sense of purpose and meaning. For individuals who

reported to use their memories for high levels of social function, I predicted that they would score higher on measures of the quality of their social relationships (Alea & Bluck, 2007; Nelson, 1993). Finally, based on the arguments that the directive function helps individuals navigate difficult emotional situations and likely resolve them more quickly (*e.g.* Krans, Näring, Becker, & Holmes, 2009; Pillemer, 2003), I predicted that individuals who reported to use their memories frequently for a directive function would also report a more positive view of themselves.

Paper 3

It is a long held assumption that the ability to construct a coherent account of our personal past is related to psychological adjustment cuts across broad areas of research including, autobiographical memory (*e.g.* Baerger & McAdams, 1999), trauma and Post Traumatic Stress Disorder (PTSD; *e.g.* Tromp, Koss, Figueredo, & Tharan, 1995), and clinical intervention (*e.g.* White & Epston, 1990). To date, there has been only one investigation into this assumption (Baerger & McAdams, 1999), and it did find a significant relation between autobiographical narrative coherence and well-being. The major focus of the third paper was to replicate the finding that autobiographical narrative coherence is related to psychological well-being, and to extend it in several ways. While Baerger and McAdams (1999) largely focused on the coherence of an individual's entire life story, I examined specific single events. Much of the current research on autobiographical memory, including studies examining relations between memory variables and well-being, focuses on single/unique events. Also, I examined the hypothesis that what we are being coherent about is also a critical feature of the relations between narrative coherence and psychological well-being. Specifically, I examined

whether the functions served (self, social, directive) influenced the size of the relation between coherence and well-being.

To examine the relations between narrative coherence and psychological well-being, narratives of single events were coded for coherence using Reese et al.'s (2011) newly developed coding scheme. Narratives were also coded for the three functions of autobiographical memory, self, social, and directive. As in Paper 2, psychological well-being was measured using a variety of psychological well-being measures from both the hedonic and eudaimonic tradition. These measures were then combined to form three major well-being factors: Purpose and Communion, Positive Self View, and Positive Relationships.

I predicted that narrative coherence would be positively related to each of these domains of psychological well-being. Further, I predicted that the relation between coherence and psychological well-being would be moderated by the function served. Specifically, (1) from McAdams (*e.g.* 1993) arguments that autobiographical narratives used to understand the self (serve a self function) help to create a sense of purpose, I predicted that the self function would moderate the relation between narrative coherence and the Purpose and Communion well-being factor; (2) based on Nelson's (1993) arguments about the role of autobiographical narratives in fostering social relationships, I predicted that the social function would moderate the relation between narrative coherence and Positive Relationships; (3) I hypothesized that the directive function would moderate the relation between coherence and Positive Self View, as using our memory to help navigate and solve difficult conflicts may have a significant impact on self view.

Autobiographical Memory Functions of Single and Recurring Events

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Abstract

Autobiographical memories are thought to serve three basic functions: self definition, social connection, and directing future behavior (Bluck, Alea, Habermas, & Rubin, 2005; Pillemer, 2003). Yet, there is little research to date examining the functions that specific autobiographical memories come to serve. Previous research suggests that the function a memory comes to serve differs by the type of event recalled (*e.g.* single unique events versus repeated or recurring events; Waters et al., *submitted*). The present research compared memories for single and recurring events on structure and function served in a sample of 103 undergraduate students. Results showed that single events were more coherent, negative, and contained more singular pronouns and past tense verbs than recurring events. Recurring events were more schematic and contained more plural pronouns than single events. Single events also served more of a self and directive function compared to recurring events, while recurring events served more of a social function.

Keywords: autobiographical memory, function, narrative, self, social, directive

Autobiographical Memory Structure and Functions of Single and Recurring Events

Recent theoretical and empirical work on the ecological functions of autobiographical memory suggests that memories of personally significant events from our lives serve three basic functions: self definition, fostering social connection, and directing future behavior (Bluck, Alea, Habermas & Rubin, 2005; Pillemer, 2001; 2003). To date, work on the self, social, and directive functions of autobiographical memory has focused primarily on demonstrating that people generally use their memory in these ways, typically assessed via questionnaire or case study. This work represents important empirical steps toward validating the proposed functions of autobiographical memory. However, it is unclear how these kinds of functional roles are expressed and used in relation to specific autobiographical memories. In preliminary work examining the functions that specific autobiographical memories come to serve, Waters, Bauer, and Fivush (*submitted*) demonstrated that the functional role a memory takes is influenced by the type of event recalled (*e.g.* single occurrences versus recurring events). Based on their findings Waters et al. (*submitted*) argued for the importance of examining multiple event types in autobiographical memory research on function. Because theirs' was the first study in the literature to address this question, many questions remain unanswered. Thus, the major objective of this research is to replicate and extend Waters et al. (*submitted*) in order to more fully examine functions of single and recurring autobiographical events.

Functions of Autobiographical Memory

The functions of autobiographical memory have been defined in a variety of ways. Researchers have suggested that autobiographical memory serves a self function by

creating a stable and enduring representation of self or identity (McAdams, 1995; Wilson & Ross, 2003). The social function has been defined as both the sharing of autobiographical memories to create intimacy, as well as to create and foster social relationships via a stable representation of a shared history between individuals (Bluck et al., 2005; Fivush, Haden & Reese, 1996; Waters, et al., *submitted*). Finally, the directive function is described as the use of/reflection on autobiographical memories to resolve problems or direct future behavior and goals (Pillemer, 2003; Kuwabara & Pillemer, 2010).

Currently, there is a growing body of research that empirically examines the functions of autobiographical memory. Bluck et al. (2005) examined the self, social, and directive functions using the “Thinking about Life Experiences Questionnaire” (TALE). Participants rated statements about how they used their memories in everyday life designed to address each function of autobiographical memory, and then the underlying factor structure of the TALE was examined. The items produced four factors, a self, two social (creating and nurturing relationships), and a directive function. Bluck et al.’s (2005) results provided some of the first empirical support for the proposed ecological functions of autobiographical memory. Kuwabara, Rouleau, and Pillemer (2011) specifically examined the directive function of autobiographical memory in a sample of school aged children who completed a set of problem solving tasks. Children who reported recalling more problem relevant autobiographical memories also generated more potential solutions for the problems during the task. This indicated that these memories helped direct current behavior. Kuwabara and Pillemer (2010) examined the directive function of autobiographical memory on donation behavior with an undergraduate

sample. Undergraduate students who were prompted to think of memories associated with their current school were more likely to donate to their school rather than another charity, compared to controls. Interestingly, these effects were more or less independent of the valence of the memories recalled. These results suggested that the quantity of autobiographical memories cued by a situation/problem prompted the directive function in ways that influenced behavior.

Regarding the measurement of the functions of autobiographical memory, previous research has relied almost exclusively on questionnaire measures of each function. This is problematic for several reasons, as pointed out by both Pillemer (2009) and Waters et al. (*submitted*). First, questionnaires only address conscious uses of memory to serve a specific function. There is research to suggest, however, that people are often not aware of the functions a memory may have served (Kuwabara & Pillemer, 2010). Secondly, questionnaire measures assume that participants are accurate at estimating the frequency, or regularity, that they use their memories for self, social, or directive functions. Finally, because questionnaire items are specified by the experimenter they are limited to addressing/measuring the experimenters proposed functions. Narrative assessment provides several solutions to these issues. Narratives allow for the integration of both explicit and more implicit goals and associations (Bruner, 1986; 1990; Conway, Singer, & Tagini, 2004). Narrative measures do not rely on participants making accurate estimates of functions served. Narratives are also extremely open-ended allowing for a more ecologically valid assessment of how memories may be used in everyday life. Thus, both questionnaire and narratives assessments of function are important, and may provide non-redundant information about the functions of autobiographical memories.

As a result, we employ both methodologies in the present study. We included questionnaire measures focused on self-reported use of specific memories to serve self, social and directive functions. In addition, narratives were assessed for both content and structure related to function. Content reflecting self, social and directive function was coded, as well as specific aspects of narrative structure reflective of function (discussed in more detail below). In addition, we examined function for two types of events, single and recurring.

Function and Event Type

Though the majority of research on autobiographical memory has focused on personally significant single events, some research suggests that autobiographical memory contains a variety of event types that may serve different functions. For example, Barsalou (1988) found multiple event types were produced in an autobiographical memory free recall task. Specifically, he found that single events were only recalled about 20% of the time, while roughly 30% of events recalled were recurring events (*e.g.* “I played a lot of softball”), and extended events made up another 9% of event memories (*e.g.* “I went to San Francisco for two weeks”). Following these observations, Waters et al. (*submitted*) examined the functions served by autobiographical memories of single, recurring and extended events. Results found that event type was a significant factor in the functions served by autobiographical memories. Single events were higher in self and directive functions, recurring events were higher in the social function, and extended events were high on all three functions. Waters et al. (*submitted*) argued that current research has overlooked the potential influence of event type on central constructs of autobiographical memory, including function, and provided

the first evidence of this. They argued that single events are critical for defining self, whereas recurring events are critical for defining social relationships over time. Extended events seemed to be an amalgam as they occur over an extended period of time with multiple single and recurring events embedded within them. In many ways, extended events seemed more like what Conway and Pleydell-Pearce (2000) described as life time periods in their self-memory model. In contrast, in the self-memory model, there is no distinction made between single and recurring events. The Waters et al. (*submitted*) findings suggested that this may be an important addition to the model. Thus in this research, we focused on single and recurring events and assessed their function both as expressed in questionnaires and in narratives. In addition, we assessed possible differences in the structure and content of the narratives that are theoretically related to function.

Narratives and Function

In terms of narrative content as related to function, Waters et al. (*submitted*) found that participants spontaneously included information about the function their memories served. They observed frequent references to turning points or other content that had helped shape identity (self function), as well as how the event helped participants realize the value of certain relationships (social function). They noted, however, that there were surprisingly low levels of directive function in autobiographical narratives and that content coding may not be the best way to capture the directive function. They further suggested that certain elements of narrative structure may be related to, or even facilitate, memory functions. For example, there is a large literature on script-like memory representations suggesting that both adults and children narrate recurring events as more

generalized, in the timeless present, and not from a first person perspective (*e.g.* “we do” or “you do”; Fivush & Slackman, 1986). The structure and perspective typical of recurring events may be better suited for the social function, in that they define what groups do across time, thus serving to consolidate bonds. Further, several researchers have argued that script-like event representations serve primarily a directive function, as their generalized structure allows them to be applied to a wider variety of situations (Nelson, 1986; Schank & Abelson, 1977). In contrast, single events tend to be more specific, detailed, and include more first person perspective than recurring, or script-like, event representations (Fivush, 1984, Hudson & Nelson, 1986). As a result, the more detailed single events may better serve the self function as identity construction likely requires both specific detail and a first person perspective (*e.g.* McAdams, 1993). Thus, the structure and content of narratives may reflect function.

In preliminary work addressing these questions, Waters et al. (*submitted*) found that single events served more of a self and directive function, were more thematically coherent, set in the past, and told from a first person singular perspective. In contrast, recurring events served more of a social function, were set in the timeless present and future, and were told from the first person plural perspective. These findings suggested that both the content and structure of narratives provide information about function, and that different types of events may serve different functions. As this was the first study in the literature to assess functions of memory using both questionnaire and narrative measures, it is in need of replication and extension.

The Present Study

The major objective of this research was to replicate and extend Waters et al.

(*submitted*) in order to verify their findings and to examine additional issues regarding functions of single and recurring autobiographical events. A secondary objective of this research was to further develop and validate narrative and questionnaire measures of function to provide useful and reliable tools for future research.

Based on research on self-defining events (*e.g.* Blagov & Singer, 2004), and on scripts (Schank, 1999; Schank & Abelson, 1977), we assumed that the functions would be reflected in narratives not only by content but by linguistic features. More specifically, we replicated and extended Waters et al. (*submitted*) by expanding measures of narrative structure and perspective beyond verb tense and pronoun use. We included language reflecting subjective perspective and internal states, as these linguistic features may also reflect the functions a memory serves. We operationalized the self function as personal pronoun and past tense verb use and internal states language indicating a personal perspective that places the self at the center of the event. We predicted that this would be more frequent in single, than in recurring, events. In contrast, plural pronoun and social processing words are proposed to be more indicative of the social function, and therefore would be more prevalent in recurring events. Finally, present and future tense verbs, as well as spatio-temporal terms, may reflect the directive function. Events maybe projected into the timeless present and future, and include information about the temporal and spatial unfolding of actions and behaviors, to better serve the directive function. It was not clear whether this would be more prevalent in single events (as predicted by Pillemer, 2003), or in recurring events (as predicted by script theory).

Waters et al. (*submitted*) assessed the social and directive functions with a single open-ended question; thus it is important to examine these functions using reliable

multidimensional rating scales. Following Pillemer's (2009) recommendation, we developed a set of questionnaire measures to assess the functions autobiographical memory using more items and a broader scope (*i.e.* not just frequency of function served).

Based on previous research, we expected that narratives of single and recurring events would differ in structure and organization in several ways. We expected that single events would be more thematically and contextually coherent, as recurring events have been proposed to be more schematic and abstract. In contrast, recurring events may be more chronologically coherent as scripts contain substantial temporal information (Waters et al., *submitted*). We expected that single events would serve a higher self function compared to recurring events. This includes a significantly higher proportion of the pronoun "I", past tense verb use, internal states language, and higher scores on questionnaire and narrative measures of the self function. For the social function, we predicted that recurring would score higher compared to single events. Specifically, we predicted that recurring events would contain more first person plural pronouns, social processing terms, and higher levels of the social function (questionnaire and narrative measures). Based on previous literature (*e.g.* Pillemer, 2003; Waters et al., *submitted*) we predicted that the directive function would be higher for single events (but see Nelson, 1986, for a contrasting argument). This includes higher proportions of present and future tense verbs, spatio-temporal terms, and higher scores on questionnaire and narrative assessments of the directive function. We also predicted that the function scores for both narrative and questionnaire measures would be significantly correlated.

Method

Participants

103 undergraduate students (56 females) were recruited from four introductory level social science courses at a mid-sized private university, and given extra credit by their instructor for their participation. 41 participants self-identified as Caucasian, 32 as Asian, 16 as African American/Black, 4 as South Asian, 2 as Hispanic, and 8 did not provide ethnicity information, or described themselves as multi-racial. Participants ages ranged from 18-28 ($M = 18.87$, $SD = 1.41$). All participants gave informed consent as approved by the Institutional Review Board.

Procedure

The data were collected as part of a larger study during the regularly scheduled meeting time of four undergraduate classes with the instructor's permission. Only those students who signed informed consent participated. Of the 109 students who received extra credit for attending the data collection sessions, six asked that their data not be used for research. These workbooks were destroyed following data collection.

Each group consisted of roughly 25 participants, and were seated in a 45-person university lecture hall. As each participant arrived they were given a narrative workbook and instructed to write narratives about four different personally significant events from their lives, two single events and two recurring events (described below). Participants were also asked to complete two sets of well-being questionnaires, however these measures were not included in the present study. Participants were given 60-90 minutes to complete the workbook. The order of the event narratives (single or recurring) and questionnaires were counterbalanced yielding eight different orders, with the event narratives preceding the questionnaires in four of the orders. Following each narrative

elicitation, participants were asked to complete questions explicitly regarding the self, social, and directive functions of the memory they just narrated. The narrative elicitation and the questionnaire tasks are described in turn.

Narrative elicitation. For each narrative, participants were encouraged to provide as much detail as possible. Based on instructions used to elicit personally significant autobiographical memories in previous research (*e.g.* McAdams, 2008):

“Single – “I would like for you to write about a single significant event in your life. This single event should be a specific happening or significant episode that happened to you in your past, set in a particular time and place. It is helpful to think of such an event as constituting a specific moment in your life which stands out to you as important.”

Recurring – “I would like for you to write about a significant recurring event in your life. This recurring event should be an event that you experienced multiple times in your life with mainly the same people and setting. This recurring event should stand out to you as an important set of experiences.”

These specific instructions were followed for both single and recurring events with:

“As you write about the [single/recurring] event you have in mind please describe, in detail, what happened, where you were, who was involved, what you did, and what you were thinking and feeling during the event. Also, try to convey what impact this single unique event has had on you, and why it is an important event in your life. Try to be specific and provide as much detail as you can.”

Questionnaires. Immediately following each narrative elicitation, participants completed three questionnaires to assess the functions that memory served (self, social, and directive). The self function was assessed with the Centrality of Events Scale (Berntsen & Rubin, 2006), a brief 7-item scale designed to assess how central an event is to a person’s sense of self or identity (Appendix A). Reliability for the Centrality of

Event Scale was calculated on our sample, Cronbach's α ranged from .88 to .91 for the four memories provided by the participants. Items were rated on a Likert-type scale from 1-7 (totally disagree – totally agree). Examples include “I feel that this event has become part of my identity” and “This event was a turning point in my life.”

The social function was assessed using a 6-item scale developed for this study to assess the extent to which each memory served a social function by facilitating, or enhancing the appreciation of, personal relationships (Appendix B). Reliability for the Social Function Scale was calculated on our sample, Cronbach's α ranged from .80 to .91 for the four memories. Items were rated on a Likert-type scale from 1-7 (totally disagree – totally agree). Examples include “When I think about this event I feel closer to my friends, family, or community”, “Thinking about this event reminds me of how important my relationships are”, and “When I share this memory I feel closer to the person(s) I am sharing with”.

The directive function was assessed using a 6-item scale developed for this study to assess the extent to which each memory served a directive function by changing behavior, or influencing decision making (Appendix C). Reliability of the Directive Functions Scale was calculated on our sample. Cronbach's α ranged from .85 to .89 for the four memories. Items were rated on a Likert-type scale from 1-7 (totally disagree – totally agree), examples include “Thinking about this event informed my decision making on several occasions” and “Thinking about this event has helped me to better understand a problem at hand”.

Narrative coding

All narratives were transcribed verbatim from the written workbooks into Word

documents, and these documents were spot checked for accuracy before coding.

Narrative structure and function were coded in two ways: (1) a computer-based word count program, Linguistic Inquiry and Word Count (LIWC; Pennebaker, Booth & Francis, 2007), was used to calculate overall word count and the proportion of pronouns, verb tenses, social, emotional, cognitive, and spatio-temporal terms. (2) the self, social, and directive functions and narrative coherence were coded on reliably developed dimensions by two independent researchers in the lab.

Narrative structure. Narrative coherence was examined along three dimensions, theme, context, and chronology (Reese, Haden, Baker-Ward, Bauer, Fivush & Ornstein, 2011). Reese et al., (2011) argued that theme, context, and chronology each represent a theoretically, and developmentally, independent aspect of narrative structure which are central to overall narrative coherence. Each dimension is coded along a 4-point scale, 0 being the absence of the characteristics of the particular dimension of coherence, and 3 indicating that all of the characteristics of that dimension of coherence are present in the narrative. Thematic coherence was defined as the extent to which a clear topic is introduced, developed, and resolved. Context scores the extent to which the narrative provides specific time and place information. Chronology assesses the level of discernible temporal sequencing in the narrative. Reliability for each coherence scale was established between two independent coders on a subset of 60 narratives (14.7%). Reliability analysis produced alphas of .89 for theme, .98 for context, and .95 for chronology. Following reliability coding the remaining narratives were coded by the reliable coders independently.

Pronouns, verb tense, social processes (*e.g.* talk, share), affective processes (*e.g.*

cried, love), positive and negative emotion words (*e.g.* happy, scared), cognitive processes (*e.g.* cause, know), perceptual processes (*e.g.* heard, saw), spatio-temporal terms (*e.g.* area, end, stop, go), and total word count were coded from each narrative using LIWC, which calculates the proportion of specified word categories in the overall narrative.

Functions. Each narrative was coded on three 4-point scales (Table 1) assessing the expression of self, social, and directive functions developed by Waters et al. (*submitted*). The self coding scheme focuses on content related specifically to aspects of increased self understanding, growth, changes in personal goals, or changes in perspective on the self or world contained in the narrative. The social function scheme focused on narrative content that conveyed a sense of valuing, developing valuable, or enhancing closeness in social relationships. The directive function scheme scored narrative content that described changes in behavior as a result of the events contained in the narrative. Each narrative received a score on self, social, and directive function scales.

Reliability was established between two independent coders on a subset of 69 narratives (17%). The intraclass correlation on the narrative measures of self, social, and directive produced alphas of .87, .90, and .86 respectively. Following reliability the remaining narratives were divided between the two coders and coded independently.

Results

Analyses focused, first, on a comparison of the structure of autobiographical narratives for single and recurring events. Second, our analyses compared the extent to which autobiographical memories of single and recurring events served a self, social, and directive function through narrative coding and questionnaire measures. We first present

a description of the types of events participants narrated by event type, followed by analyses of narrative structure by event type, and conclude with analyses of function served both within and across event type.

Description of Events

Participants were asked to freely nominate personally significant memories. To describe the events nominated we formed four major categories each, with several subcategories. Each event was assigned into a category mutually exclusive category. A summary of that categorization can be found in Table 2. Single events were broadly distributed across the categories, but tended to focus more on graduation/school, relationships with friends/family, and illness/injury/accidents. Recurring events were largely about times with friends/family.

Narrative Structure by Event Type

Coherence. Single and recurring events were compared on three dimensions of coherence (theme, context, and chronology) coded from each narrative. An initial 2 (event type) x 3 (coherence scale) repeated measures ANOVA revealed a significant event type x coherence interaction ($F(2, 80) = 21.44, p < .001$). Follow-up *t*-Tests and descriptive statistics are summarized in Table 3. Results suggested that single events are more thematically coherent and are more chronologically organized than recurring events. Recurring events, however, contained significantly more contextual detail.

LIWC. The total word count and mean proportion of pronouns, verb tense (past, present, future), social processes, affective processes, cognitive processes, perceptual processes, and spatio-temporal processes were calculated for each narrative. Means were then created for each event type and compared using dependent *t*-Tests. The results of

these comparisons are found in Table 4.

Overall, single events were significantly longer, but this difference failed to be significant following a Bonferroni correction for familywise error. For pronouns, single events contained a higher proportion of “I”, while recurring events contained a significantly higher proportion of “We”. For verb tense, single events contained a significantly higher proportion of verbs in the past tense, while recurring events contained a significantly higher proportion of present and future tense verbs.

When looking at more macro level linguistic categories, we found that single and recurring events did not differ on use of social process terms. Single events did contain more affective process terms in general (although not if corrected for familywise error) and, more negative emotion terms compared to recurring events. Recurring events contained a significantly higher proportion of both cognitive and spatio-temporal terms, but event types did not differ in use of perceptual process terms. Overall, personally significant single events, compared to recurring, contained more emotional language in general, but specifically more negative emotion. Recurring events contained more cognitive and spatio-temporal terms, and event types did not differ in their use of social process terms.

Function and Event Type

Narrative. An initial 2 (event type) x 3 (function) repeated measures ANOVA was conducted to determine if there were any significant differences in the self, social and directive functions personally significant single and recurring autobiographical memories served. The ANOVA produced a significant effect of event type ($F(1, 95) = 7.64, p = .007$), function ($F(1, 95) = 93.84, p < .001$), and an event type x function interaction

($F(1, 95) = 41.23, p < .001$). Follow up analyses examined each function across event types, and within event types. Results for these follow-up analyses are summarized in Figure 1. Comparisons of event type by function reveal that the self and directive functions were significantly higher for single events ($t(96) = 7.44, p < .001$; $t(96) = 2.49, p = .015$), while the social function was significantly higher in recurring events ($t(96) = -4.08, p < .001$). Looking within event type, results showed that single events served significantly more self function compared to social or directive ($t(96) = 7.59, p < .001$; $t(96) = 12.90, p < .001$), and more social function compared to directive ($t(96) = 2.79, p < .001$). Recurring events, however, served more of a social function compared to self or directive functions ($t(96) = -4.00, p < .001$; $t(96) = 10.99, p < .001$), and more of a self function than directive ($t(96) = 9.39, p < .001$). These analyses suggested that single events serve more of a self function than any other function, and more of a self function than recurring events. Recurring events, meanwhile, served more of a social function than any other function, and more of a social function than single events. The directive function appeared very minimally in the narratives, and was significantly lower than the other functions regardless of event type, but single events did serve more of a directive function than recurring events.

Questionnaire. An initial 2 (event type) x 3 (function) repeated measures ANOVA was conducted to determine if there were any significant differences in the self-reported functions that personally significant single and recurring autobiographical memories served. The ANOVA produced a significant main effect for function ($F(1, 99) = 58.70, p < .001$), and an event type x function interaction ($F(1, 99) = 48.30, p < .001$); but no significant effect of event type was found ($F(1, 99) = 82, p = .368$). Follow up analyses

examined each function across event types, and within event types. Results for these follow-up analyses are summarized in Figure 2. Comparisons of event type by function revealed that single events served significantly more self ($t(99) = 2.51, p = .014$) and directive functions ($t(99) = 4.61, p < .001$), while the social function was significantly higher for recurring events ($t(99) = -4.08, p < .001$). Looking within event type, results showed that single events were reported to serve equal levels of self and social function ($t(99) = -.10, p = .317$), with directive function significantly lower than both self and social functions ($t(99) = 2.22, p = .03; t(99) = 2.53, p = .013$). A Bonferroni correction for familywise error resulted in the difference between self and directive functions in the single events falling outside the significance level of $p < .05$. Recurring events, however, served more of a social function compared to self or directive functions ($t(99) = -9.64, p < .001; t(99) = 12.41, p < .001$), and more of a self function than directive ($t(99) = 5.84, p < .001$).

The analyses examining event type and function in the questionnaire data yielded similar results to the analyses conducted on the narrative data. Just like with the narrative data, the self and directive functions were higher in the single events and the social function was higher in the recurring events. Interestingly, the within event analyses differed slightly in the questionnaire data. Specifically, single events did not differ in the level of self and social functions they served, and the difference between those functions and the directive function was marginally significant when factoring in familywise error. However, the questionnaire results within the recurring events were identical to the narrative results. Recurring events served significantly higher levels of social function, followed by self function, and finally directive function.

Given the similarity in narrative expression and self-report of the three functions of autobiographical memories, we examined whether functions expressed were related across tasks. Table 5 displays correlations between questionnaire and narrative measures of the self, social, and directive functions. Questionnaire and narrative measures of the self and social functions were significantly correlated for both event types, and the directive function measures were significantly correlated only for recurring events.

Discussion

In this study we replicated and extended the literature on the structure and functions of autobiographical memory for single and recurring event memories. In terms of narrative structure indicative of function, we found that single events were more thematically and chronologically coherent, contained more of the pronoun “I”, and higher levels of past tense verbs, indicating a higher self function. Recurring events contained higher proportions of the pronoun “we”, present tense verbs, and future tense verbs, suggesting a higher social and directive function. Single events also contained a higher proportion of negative affect, while recurring events contained higher proportions of cognitive and spatio-temporal terms, which somewhat contradicted our predictions. Our examination of autobiographical memory functions with narrative coding, fitting with our predictions, found that single events scored higher on self and directive functions, while recurring events scored higher for social function. Within event types, single event narratives scored highest on the self function followed by social function and directive function scores. Recurring events scored highest on the social function, followed by the self function, and the directive function scoring the lowest. Questionnaire assessments of the functions of autobiographical memory produced similar results. Single events, again,

scored higher on self and directive function scales compared to recurring events, while recurring events scored higher on the social function scale. Analyses examining functions severed within event type produced slightly different results, compared to the narrative coding. For single events, self and social function scores did not differ, self and directive scores were marginally different, but the social function scores were higher than directive (just as with the narrative coding). The questionnaire results for recurring events paralleled the narrative findings, social function scores were highest, followed by self, and directive scores being the lowest. Finally, we examined the extent to which narrative and questionnaire measures of the same function correlated. For both event types, self and social function measures were significantly correlated, but measures of the directive function were only correlated for recurring events.

The narrative structure results suggested that autobiographical memories of single and recurring events are organized in different ways. Single events seemed to be more organized around the self as the experiencer. Single events were both more thematically and chronologically coherent, compared to recurring events. This suggests that single events contained more resolutions, links to other autobiographical events, and organized actions along a discernible personal timeline. Recurring events included more time and place information than single events, suggesting a more external, and possibly social, orientation. The word count results suggested that single events are, again, more focused on the self. Single events contained more first person pronouns, were located more in the past, and were more emotional (specifically negative). Recurring events were more social and possibly directive (though this does not fit with other narrative or questionnaire findings). They contained more of the pronoun “we”, were located more in

the present and future (possibly because they were still ongoing), and contained more contextual detail (*i.e.* spatio-temporal terms). Surprisingly, recurring events also contained a higher proportion of cognitive processes terms, which we predicted would reflect a self perspective. However, higher levels of cognitive processing terms in the recurring events may be related to the recurring events being more social in general. More social actors may require attending to and coordinating the mental states of others, and result in more cognitive processing words. Current theories of the structure and organization of autobiographical memory (*e.g.* Conway, 2005) currently make little or no distinction between single and recurring events. Our results suggested that single and recurring events are structured and organized differently in autobiographical memory, and that this distinction is fruitful for understanding how memories are represented and used in everyday life.

Our findings with multiple measures of the self, social, and directive functions largely replicated the previous research, and confirmed our hypotheses. Across measures (narrative and questionnaire), we found that single events served more of a self function compared to social or directive. This supports previous literature which has focused on single events as critical for identity and personality. Recurring events, regardless of measure, served more of a social function. Recurring events unfold over longer periods of time, which may make them better suited to serve a social function as they can better capture the significant impact of personal relationships. As well, recall and reminiscing of such experiences may better facilitate closeness because recurring events are so large in temporal scope and likely contain more to reminisce about (and contained less negative affect). Single events scored significantly higher on directive the function,

supporting Pillemer's (2003) arguments for the directive power of single episodes. This results should, however, be viewed in the context of the other functions. Though single events may serve a greater directive function compared to recurring events, in general the directive function autobiographical memory seems to be less common overall. This suggests, at least for emerging adults, that autobiographical memory may be used more for self-definition and supporting/facilitating relationships (see Fivush, 2010, for full arguments).

Beyond our examination of autobiographical memories for single and recurring events in terms of narrative structure and functions served, we aimed to develop valid and reliable narrative coding and questionnaire measures designed to assess the functions autobiographical memories serve. Both domains of measurement have strengths and weaknesses, and are likely best used in concert. Narratives allow for the integration of specific event details and implicit meaning, perspectives, and associations (Bruner, 1986). The features may not be tapped by explicit measures such as questionnaires. However, questionnaires can be tailored to assess/prompt specific dimensions of each function in ways a narrative cannot.

Currently, work on the functions of autobiographical memory has not focused on how specific memories come to serve any given function (but see Rasmussen & Berntsen, 2009). Instead research has focused on questionnaire reports of how people use their autobiographical memories more generally (*e.g.* Bluck et al., 2005). This work has been important in validating the existence of three discrete functions of autobiographical memory. Our aim was to extend this work to the level of individual memories. Based on our results, we believe we have succeeded in developing both reliable and valid

questionnaire and narrative measures of the functions of autobiographical memory. Future research is needed to further validate these measures but initial results seem promising.

Future research should also seek to better understanding how the functions of autobiographical memory develop across the lifespan. McAdams, Bauer, et al. (2006) found minimal stability in the specific events included in the life story in a four year longitudinal study. Similarly, it is likely that the functions a specific memory serves is not stable across the lifespan. For example, many of the recurring events described in this study involved family. It is possible that though these events did not serve a directive function in late adolescence, in adulthood these memories of recurring events from childhood may direct parenting behavior or the establishment and maintenance of family rituals (all directive functions). A single event about graduating high school may serve a significant self function as a college freshman, but will likely take a back seat to graduating from college later in life. As well, we readily acknowledge our patterns of results for functions, within and across event type, may differ across cultures. Research on less individual focused cultures suggests that the self and social functions may not be equally prevalent across cultures. Our understanding of the functions autobiographical memory serves would be significantly deepened with more diverse samples, both within western cultures and outside of them.

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Appendix – A

Centrality of Events Scale (Self Function) - CES

Please think back upon the event that you just wrote about and answer the following questions in an honest and sincere way. Circle 1 to 5.

1. I feel that this event has become part of my identity.

totally disagree 1 2 3 4 5 totally agree

2. This event has become a reference point for the way I understand myself and the world.

totally disagree 1 2 3 4 5 totally agree

3. I feel that this event has become a central part of my life story.

totally disagree 1 2 3 4 5 totally agree

4. This event has colored the way I think and feel about other experiences.

totally disagree 1 2 3 4 5 totally agree

5. This event permanently changed my life.

totally disagree 1 2 3 4 5 totally agree

6. I often think about the effects this event will have on my future.

totally disagree 1 2 3 4 5 totally agree

7. This event was a turning point in my life

totally disagree 1 2 3 4 5 totally agree

Appendix – B

Social Function Scale - SFS

Please think back upon the event that you just wrote about and answer the following questions in an honest and sincere way. Circle 1 to 5.

1. When I think about this event I feel closer to my friends, family, or community.

totally disagree 1 2 3 4 5 totally agree

2. When I share this memory with others I feel closer to the person(s) I am sharing with.

totally disagree 1 2 3 4 5 totally agree

3. Thinking about this event makes me appreciate the valuable contributions my friends, family, or community have made in my life.

totally disagree 1 2 3 4 5 totally agree

4. Thinking about this event reminds me of how important my relationships are.

totally disagree 1 2 3 4 5 totally agree

5. When I share this memory with others I am reminded of the positive effect my family, friends, or community has had on my life.

totally disagree 1 2 3 4 5 totally agree

6. When I share this memory I feel closer to the people who shared the experience with me.

totally disagree 1 2 3 4 5 totally agree

Appendix – C

Directive Function Scale - DFS

Please think back upon the event that you just wrote about and answer the following questions in an honest and sincere way. Circle 1 to 5.

1. Thinking about this event has informed my decision making on several occasions.

totally disagree 1 2 3 4 5 totally agree

2. This event has led to changes in the way I act or behave.

totally disagree 1 2 3 4 5 totally agree

3. This event has led to changes in my expectations/standards for myself, my relationships, or the world.

totally disagree 1 2 3 4 5 totally agree

4. I talk about this event to others when I want to help them make a decision.

totally disagree 1 2 3 4 5 totally agree

5. Thinking about this event has helped me to better understand a problem at hand.

totally disagree 1 2 3 4 5 totally agree

6. Thinking about this event has influence my goals in life.

totally disagree 1 2 3 4 5 totally agree

Table 1

Narrative Coding Schemes of Self, Social, and Directive Function.

<p><i>Self</i></p>	<p><i>0 – No content suggesting the memory functions to define self or enhance self</i></p> <p><i>1 – Any mention of self enhancing or self deprecation due to reflection or remembering the experience, any mention of similarity or difference of self and other, any labeling of self as a member of a group, identification with an individual or group without further elaboration, identification of personal goals, or explicit mention of personal traits.</i></p> <p><i>2 – Any mention of a turning point, milestone, eye opening experience, change in perspective –OR– elaboration on the content listed in scoring criteria for a “1”</i></p> <p><i>3 – Elaboration on why event/experience was a turning point, milestone, eye opening experience, or an explanation of how an experience led to a change in perspective in relation to self –OR– elaboration of the impact of the event on self or identity –OR- elaboration of change in personal goals or attitude</i></p>
<p><i>Social</i></p>	<p><i>0 – No content suggesting a positive stance or a sense of valuing personal relationships</i></p> <p><i>1 – Any mention that a relationship or tradition is meaningful or valuable without further elaboration –OR– any description of a relationship as helpful –OR– missing an individual or period in a relationship</i></p>

	<p>2 – <i>Minimal elaboration on the meaning or value of a social relationship or tradition –OR– mention of the developmental history of a relationship with a positive or valuing tone (note: do not count event focused elaborations, only code for elaborations on meaning or value of the relationship)</i></p> <p>3 – <i>Extensive elaboration of the value of a social relationship –OR– a description of the developmental history of a relationship with intense positive regard</i></p>
<p><i>Directive</i></p>	<p>0 – <i>No content suggesting a change in behavior as a result of the experience</i></p> <p>1 – <i>Any mention of a change in a specific behavior as a result of the experience –OR– change of behavior tied to a specific location/person/context –OR– behavior changed on a single occasion “so I stopped going to her house” or “as a result I decided to drop calculus”</i></p> <p>2 – <i>Change in specific behavior is generalized to a class of events i.e. “I no longer walk the streets alone at night” –OR– “I am now more careful in swimming pools”</i></p> <p>3 – <i>Change in behavior is generalized to multiple contexts/relationships OR elaboration on the change of multiple behaviors across contexts</i></p>

Table 2

Events Narrated by Category in Percent

<i>Event Type</i>	<i>Single Events</i>	<i>Recurring Events</i>
<u>Personal</u>	29%	18%
Religious	4	5
Graduation/School	15	3
Success	5	0
Work/Volunteering/Career	3	4
Routines	0	5
Transgressions	1	0
<u>Relationships</u>	39%	59%
Friends/Family	22	57
Dating	7	1
Confrontation	2	0
Loss	7	0
<u>Activities</u>	17%	20%
Nature	2	1
Travel	9	9
Sports	3	5
Music	2	3
Miscellaneous Leisure	1	2
<u>Miscellaneous</u>	15%	3%

Illness/Injury/Accidents	11	2
Miscellaneous	4	1

Table 3

Two-tailed Dependent t-Tests with Three Dimensions of Narrative Coherence by Event Type

	Single Events		Recurring Events		<i>t</i> (<i>df</i>)	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Theme	2.5	.54	2.29	.56	3.38 (96)	.001
Context	2.08	.66	2.30	.65	-2.40 (95)	.018
Chronology	2.53	.70	2.05	.88	4.35 (83)	<.001

Table 4

Two-Tailed Dependent t-Tests with Word Count Variables by Event Type

	Single Events		Recurring Events		<i>t</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Length	197.84	94.38	170.76	74.11	2.75	.008[†]
Pronouns						
- I	9.8	2.22	8.44	2.36	5.15	<.001
- We	1.37	1.27	2.18	1.62	-3.85	<.001
Verb Tense						
- Past	8.64	2.57	3.34	2.18	16.92	<.001
- Present	3.70	1.98	7.16	3.01	-11.93	<.001
- Future	.60	.56	1.33	1.03	-6.14	<.001
Social	9.11	3.09	9.71	3.25	-1.40	.165
Affect	5.17	1.78	4.48	1.65	2.93	.004[†]
- Positive Emotion	3.29	1.65	3.55	1.57	-1.07	.286
- Negative Emotion	1.84	1.23	.90	.87	5.93	<.001
Cognitive	16.80	2.67	19.16	2.85	-6.39	<.001
Perceptual	2.40	1.30	2.12	1.22	1.51	.133
Spatio-temporal	16.83	3.32	18.77	3.41	-4.46	<.001

Note: *df* = 96 for all test. [†] indicates that the significant difference observed would not be significant following a Bonferroni correction for familywise error.

Table 5

Correlations between Narrative and Questionnaire Assessments of Memory Function within Event Type

		Narrative Coding						
		Single Events			Recurring Events			
		Self	Social	Directive	Self	Social	Directive	
Questionnaire	Self	.343**	.271*	.082	Self	.343**	.145	.348**
	Social	.145	.380**	-.121	Social	.096	.424**	.091
	Directive	.341**	.196	.145	Directive	.259**	.258**	.279**

* $p < .05$, ** $p < .01$.

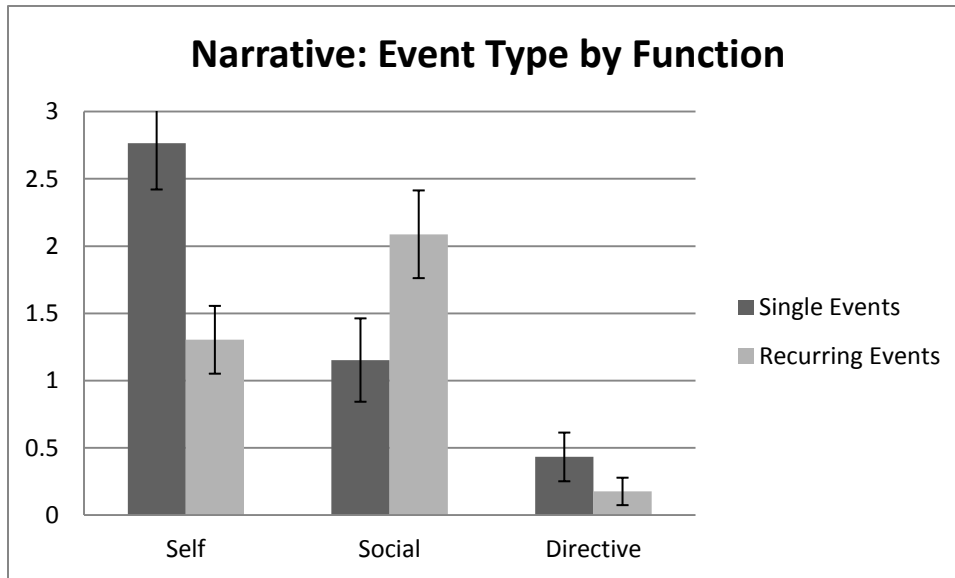


Figure 1. Mean function scores from the narratives across event types. Error bars represent 2 *SEM*.

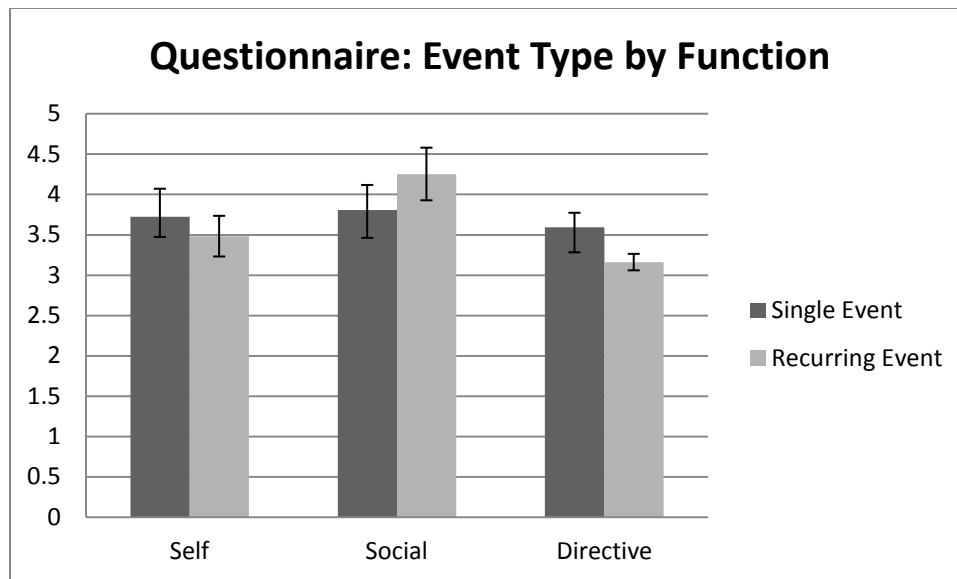


Figure 1. Mean function scores from the questionnaires across event types, Error bars represent 2 *SEM*.

Relations Between the Functions of Autobiographical Memory and

Psychological Well-being

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Abstract

Researchers have proposed that autobiographical memory serves three basic functions in everyday life: self definition, social connection, and directing behavior (*e.g.* Bluck, Alea, Habermas, & Rubin, 2005). However, no research has examined relations between the functions of autobiographical memory and functioning (*i.e.* psychological well-being). The present research examined the relations between the self, social, and directive functions of autobiographical memory and three factors of psychological well-being in single and recurring autobiographical memories. 103 undergraduate students were recruited and provided ratings of each function for four autobiographical memories (two single, two recurring). Results found that individuals who use their autobiographical memories to serve self, social, and directive functions reported higher levels of Purpose and Communion and Positive Relationships, but that these relations differ slightly by event type.

Keywords: autobiographical memory, function, self, social, directive, well-being

Relations Between the Functions of Autobiographical Memory and
Psychological Well-being

Over the course of nearly the last 100 years, memory researchers have admonished a decontextualized, laboratory controlled, and often theory-less approach to the study of autobiographical memory phenomena (*e.g.* Baddeley, 1988; Bartlett, 1932, Neisser, 1982). In recent decades a more functional approach to research on our memories for personal experiences emerged, prompted by these often emphatic calls for a more ecological perspective. To answer Baddeley's (1988) now famous question to autobiographical memory researchers, "but what the hell is it for?", three answers have emerged: (1) self definition and continuity; (2) creating, maintaining and representing social connections; (3) directing future behavior. Though there may be other potential functions of autobiographical memory, it is widely agreed that autobiographical memory serves at least these three functions (Pillemer, 2009).

Surprisingly, whereas several studies have demonstrated that people report using their memory along these lines (*e.g.* Bluck, Alea, Habermas, & Rubin, 2005; Waters & Fivush, *submitted*), no research has investigated the extent to which the functions of autobiographical memory relate to functioning (*i.e.* psychological well-being). The autobiographical memory literature is not short on empirical links between memory and functioning/psychological well-being. However, the literature linking autobiographical memory variables to psychological well-being focuses on themes such as "meaning making" (*e.g.* McLean & Pratt, 2006), and organizational features like narrative coherence (Baerger & McAdams, 1999). Research examining links between

autobiographical memory and psychological well-being has not directly address the role of memory functions, despite extensive theoretical discussion that suggests using our memories to serve the self, social, and directive functions can be highly adaptive (*e.g.* Nelson, 1993). Thus the major goal of this research was to examine relations between the self, social, and directive functions served by personally significant autobiographical memories and psychological well-being. We begin with a brief review of research on the functions of autobiographical memory, followed by a review of the literature linking autobiographical memory variables and psychological well-being, and conclude with a discussion of the potential links between autobiographical memory function and psychological well-being.

Functions of Autobiographical Memory

The functions of autobiographical memory have received increasing attention over the last decade, with growing consensus on three functional domains: self, social, and directive. The self function refers to the major role autobiographical memories play in helping us understand who we are, and to create a stable and enduring representation of our selves over time (*e.g.* Bluck, 2003; Wilson & Ross, 2003). The social function involves using autobiographical memory to create and maintain intimacy through sharing personal memories, as well as creating a stable representation of a shared history between individuals (Bluck et al., 2005; Fivush, Haden & Reese, 1996; Waters, Bauer, & Fivush, *submitted*). The directive function refers to the use of autobiographical memories to foster decision making, or to help navigate difficult situations (Krans, Näring, Becker, & Holmes, 2009; Pillemer, 2003).

Early work examining the self, social, and directive functions of autobiographical memory focused on demonstrating that participants use their memory along these lines, and in the predicted manner (*e.g.* recalling a relevant memory to help solve a novel problem). For example, Bluck et al. (2005) asked participants to complete a questionnaire with a variety of items related to the self, social, and directive functions and examined the factor structure produced by those items. Results confirmed the existence of four independent functions; one self, two social (creating and nurturing relationships), and a directive function. Alea and Bluck, (2007) examined the social function by asking participants to recall memories about their romantic partner and examining changes in feelings of intimacy with that partner. They found that recalling relationship events produced increases in feelings of warmth and closeness, suggesting that those memories served a social function. Kuwabara and Pillemer (2010) examined the directive function autobiographical memories served in relation to donation behavior in a sample of undergraduate students. Students who were prompted to think of memories associated with their current school were more likely to donate to their school rather than another charity, compared to controls.

Waters et al. (*submitted*) compared the functions served by different events types (single, recurring, and extended). They found that single events tended to serve more of a self and directive function, recurring events served more of a social function, and that extended events were comparatively high on all three functions. They suggested that event characteristics may be an important feature to examine in research on the functions of autobiographical memory. The limited research conducted thus far has provided critical demonstrations that autobiographical memories do indeed serve a self, social, and

directive function. The stage is now set for a more detailed examination of the functions specific autobiographical memories serve, and how those functions may relate to psychological well-being.

Autobiographical Memory and Well-being

A wide range of research, using a variety of paradigms, has found links between autobiographical memory constructs and psychological well-being. The most commonly investigated relations between autobiographical memory and well-being examine a family of constructs referred to as “meaning-making”. Although there is no fully agreed upon definition of meaning-making, the literature suggests that meaning-making within autobiographical memory is accomplished through the creation of more coherent narratives (Reese, Haden, Baker-Ward, Bauer, Fivush, & Ornstein, 2011), through the use of internal states language describing thoughts and emotions (Fivush & Baker-Ward, 2005; Pennebaker & Chung, 2011), and through reflection on lessons learned about the self, relationships, and the world (see Fivush, Bohanek, Zaman, & Grapin, *in press*, for a full discussion). For example, more expression and explanation of emotion in autobiographical narratives of positive events was related to higher levels of psychological well-being in a sample of adolescents (Bohanek, 2006). McLean and Pratt (2006) found that more sophisticated meaning-making, defined as connecting the memory to an understanding of self, was related to identity maturity, generativity, and optimism. McLean, Breen, and Fournier (2010) found that sophistication of meaning-making predicted psychological well-being for older adolescents, but not for younger adolescents.

Despite fairly convincing results, work linking autobiographical memory variables to psychological well-being has not taken a fully functional approach. We argue that while “meaning-making” is clearly an important construct, the extent to which individuals use their memories to serve self, social, and directive functions may also be related to psychological well-being.

Autobiographical Memory Functions and Functioning

Researchers have long argued that autobiographical memories facilitate adaptive behavior and development. In terms of the self function, McAdams (1985; 1993; 1996) argued that we use autobiographical memories to construct our identities, a critical developmental task and an important feature of psychological adjustment. The creation of an identity facilitates a sense of purpose and meaning across time. In terms of the social function, Nelson (1993) suggested that sharing/reminiscing about autobiographical memories (an aspect of the social function) is adaptive in that it creates a supportive social network which facilitates emotional and psychological. This likely contributes to increased psychological well-being. In terms of the directive function, Brown and Kulik (1977) proposed that memory for emotional, and personally significant, events may be valuable because they can be recollected to inform future behavior (directive function; see Pillemer, 2003 for full discussion). We argue here, that frequent use of autobiographical memories to navigate difficult emotional conflicts, and resolve problems more effectively, has strong implications for positive self perception which is a critical feature of psychological well-being (see Keyes & Magyar-Moe, 2003 for full discussion). Based on these arguments, we examined if individuals who use their

memories to serve high levels of the self, social, and/or directive functions also experience higher levels of psychological well-being, in terms of a sense of purpose and meaning, positive relationships and support, and positive self perception.

Present Study

In the present study, the functions served by autobiographical memories were assessed using three questionnaires: the Centrality of Events Scale (self function; Berntsen & Rubin, 2006), the Social Function Scale (Waters & Fivush, *submitted*), and the Directive Functions Scale (Waters & Fivush, *submitted*). In order to capture a representative sample of autobiographical memories we examined both single and recurring event memories. Previous research suggests that autobiographical contain multiple event types, and that the prevalence of self, social, and directive functions tends to vary by event type (Barsalou, 1988; Waters et al., *submitted*; Waters & Fivush, *submitted*). Because this was the first study to examine relations between memory functions and psychological well-being, we include a wide variety of psychological well-being measures. Following Keyes and Magyar-Moe (2003), we included psychological well-being measures assessing individual and social/relational aspects of well-being along two major dimensions, eudaimonic and hedonic well-being. The eudaimonic model of well-being (*e.g.* Bauer, McAdams, & Pals, 2008; Keyes & Magyar-Moe, 2003) focuses on one's sense of purpose and positive functioning, while the hedonic model of well-being focuses on positive affect (Keyes & Magyar-Moe, 2003; Ryan & Deci, 2001; Ryff & Singer, 1998).

Following from McAdams' (*e.g.* 1993; 1996) arguments about the importance of

autobiographical memory for identity development, sense of purpose, and functioning, we predicted that individuals who tended to use their memories for more of a self function would self report higher scores in terms of purpose. For individuals who reported to use their memories for high levels of the social function, we predicted that they would score higher on measures of the quality of their social relationships (Alea & Bluck, 2007; Nelson, 1993). Finally, based on the arguments that the directive function helps individuals navigate difficult emotional situations and likely resolve them more quickly (*e.g.* Brown & Kulik, 1977; Krans et al., 2009; Pillemer, 2003) we predicted that individuals who reported to use their memories for high levels of directive function would also report a more positive view of themselves.

Method

Participants

103 undergraduate students (56 females) were recruited from 4 introductory level social science courses at a mid-sized private university, and given extra credit by their instructor for their participation. 41 participants self-identified as Caucasian, 32 as Asian, 16 as African American/Black, 4 as South Asian, 2 as Hispanic, and 8 did not provide ethnicity information, or described themselves as multi-racial. Participants ages ranged from 18-28 ($M = 18.87$, $SD = 1.41$). All participants gave informed consent as approved by the Institutional Review Board.

Procedure

The data described here are part of a larger study examining autobiographical memory using both narrative and questionnaire variables. Only the questionnaire variables were included in this study. For a report on the narrative variables see Waters

and Fivush (*submitted*).

Data were collected during the regularly scheduled meeting time of four undergraduate classes following the instructor's permission. Only those students who signed informed consent participated. Of the 109 students who received extra credit for attending the data collection sessions, six asked that their data not be used for this research. These workbooks were destroyed following data collection.

Each group consisted of roughly 25 participants and were seated in a 45-person university lecture hall. As each participant arrived they were given a workbook and instructed to nominate four different personally significant events from their lives: two single events and two recurring events. Participants were asked to rate these memories on a set of questionnaires evaluating the self, social, and directive functions that their memory served. Participants were also asked to complete two sets of well-being questionnaires, one set to measure well-being in terms of self evaluation and the other to measure the quality and functioning of social relationships. Participants were given 60-90 minutes to complete the workbook. The order of the event memories rated for function (single or recurring), and the well-being questionnaires (self or social), were counterbalanced.

Measures: Memory function

Participants completed three questionnaires to assess the functions served by each memory (self, social, and directive). The self function was assessed with the Centrality of Events Scale (Berntsen & Rubin, 2006), a brief 7-item scale designed to assess how central an event is to a person's sense of self or identity (Appendix A). Reliability for the Centrality of Event Scale was calculated on our sample, Cronbach's α ranged from .88 to

.91 for the four memories provided by the participants. Items were rated on a Likert-type scale from 1-7 (totally disagree – totally agree). Examples include “I feel that this event has become part of my identity” and “This event was a turning point in my life.”

The social function was assessed using a 6-item scale developed for this study to assess the extent to which each memory served a social function by facilitating, or enhancing the appreciation of, personal relationships (Appendix B). Reliability for the Social Function Scale was calculated on our sample, Cronbach’s α ranged from .80 to .91 for the four memories. Items were rated on a Likert-type scale from 1-7 (totally disagree – totally agree). Examples include “When I think about this event I feel closer to my friends, family, or community”, “Thinking about this event reminds me of how important my relationships are”, and “When I share this memory I feel closer to the person(s) I am sharing with”.

The directive function was assessed using a 6-item scale developed for this study to assess the extent to which each memory served a directive function by changing behavior, or influencing decision making (Appendix C). Reliability of the Directive Functions Scale was calculated on our sample. Cronbach’s α ranged from .85 to .89 for the four memories. Items were rated on a Likert-type scale from 1-7 (totally disagree – totally agree), examples include “Thinking about this event informed my decision making on several occasions” and “Thinking about this event has helped me to better understand a problem at hand”.

Measures: Well-being and self

Well-being derived from a positive self image, individual accomplishments, and positive functioning, was assessed using three scales: (1) Satisfaction With Life Scale

(Diener, Emmons, Larson, & Griffin, 1985); (2) Rosenberg Self-Esteem Scale (Rosenberg, 1965); 3) Psychological Well-Being Scale (Ryff & Keyes, 1995). These measures were selected to capture two broad categories of well-being discussed by Keyes and Magyar-Moe (2003), hedonic and eudaimonic well-being.

Satisfaction With Life scale. Diener et al. (1985) developed this scale to assess an individuals' satisfaction with their life as a whole. This brief questionnaire includes five Likert items rated on a 1 to 7 scale (*e.g.* "In most ways my life is close to ideal"). This scale has demonstrated good discriminant validity from other measures of well-being, and has been established as a reliable measure of well-being (Pavot & Diener, 1993; 2008). This scale focuses on an individuals' appraisal of their life and personal accomplishments as a whole with no questions directly addressing social relationships, and is therefore a suitable measure for self focused well-being.

Self-esteem. Rosenberg (1965) developed this scale to assess individuals' positive/negative view of themselves. The questionnaire includes 10 statements that participants are asked to rate from 1 to 4, "4" being strongly disagree, and "1" being strongly agree (*e.g.* "On the whole, I am satisfied with myself"). This scale has well established test-retest reliability, concurrent, predictive, and construct validity (Rosenberg, 1979). The Rosenberg (1965) Self Esteem Scale is an appropriate measure for the self focused domain of well-being due to its exclusive emphasis, in both theory and design, on individual characteristics (*e.g.* "I feel I am a person of worth") and an absence of items evaluating social relationships, or an individual's aptitude at forming and maintaining social relationships.

Psychological Well-Being. Ryff and Keyes (1995) developed this scale to assess six theoretically distinct well-being dimensions; Autonomy, Environmental Mastery, Personal Growth, Purpose in Life, Self Acceptance, and Positive Relations. The 54 item Likert-type scale is well validated for both construct and predictive validity (Ryff & Keyes, 1995). Items include “I feel confident and positive about myself” (Self Acceptance item), “I have a sense that I have developed a lot as a person over time” (Personal Growth item). The subscales we will use are all suitable measures of individual well-being because they focus on specific dimensions of well-being that stem from an individuals’ evaluation of themselves.

Measures: Well-being and social relationships/functioning

Well-being derived from positive appraisal of one’s social relationships and functioning was assessed using three questionnaires: (1) Multidimensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet, & Farley, 1988); (2) Social Well-Being Scale (Keyes, 1998); (3) Loyola Generativity Scale (McAdams & de St. Aubin, 1992). These measures were selected to capture well-being in a more social context/domain within two broad categories of well-being, hedonic and eudaimonic (Keyes & Magyar-Moe, 2003).

Perceived Social Support. Zimet et al. (1988) developed the Multidimensional Scale of Perceived Social Support (MSPSS) in order to assess an individual’s appraisal of the adequacy of their social support in three domains of personal relationships: friends, family, and romantic partners. The 12-item Likert-type scale yields three subscale scores, one for each domain of personal relationships. These subscales have

demonstrated good reliability, construct validity, and subscale reliability (Zimet et al., 1988; Zimet, Powell, Farley, Werkman, & Berkoff, 1990).

Social Well-Being Scale (SWB). The 50-item Social Well-Being Scale developed by Keyes (1998) was designed to assess five theoretically proposed dimensions of social well-being based on the kinds of tasks encountered by individuals in their social networks and communities. The five subscales include: Social Integration, Social Contribution, Social Coherence, Social Acceptance, and Social Actualization. Social Integration refers to an individual's sense that they share something in common with their community. Social Contribution refers to an individual's sense of their value as a member of society. Social Coherence refers to the perception of the social world as orderly and organized. Social Acceptance measures the extent to which an individual trusts others and holds a positive view of human nature. Finally, Social Actualization refers to one's sense that society at large has potential, and is realizing that potential through its institutions and citizens. These scales have been well validated and show strong construct, convergent, and discriminant validity (Keyes, 1998).

Loyola Generativity Scale (LGS). Generativity refers to both an individual's positive view of their relationship with their community, and a motivation to give back to that community. Erikson (1963; 1968) proposed that as personality develops beyond forming a sense of self and establishing long term relationships, individuals must either become generative, developing a positive view of their community and a desire to give back, or turn toward isolation. The LGS (McAdams & de St. Aubin, 1992) assesses generativity by asking participants to rate 20 statements on a scale of 0-3 on how well

statements apply to the individual (*e.g.* “I try to pass along the knowledge I have gained through my experiences”). This scale has shown good retest reliability and construct validity. The LGS is theoretically relevant for this study because it reflects an orientation toward valuing, benefiting from, and nurturing social relationships in the community (McAdams & de St. Aubin, 1992), which are critical features of the social function of autobiographical memory.

Results

Our analyses aimed to address two major questions: 1) Do individuals who use their memories to serve any particular function score higher on measures of psychological well-being; 2) Do the patterns of relations between the function of autobiographical memory and well-being differ by the type of event being recalled (single or recurring). To address these questions our analyses first focused on data reduction for the well-being measures included in this study using principle components analysis (PCA). To foreshadow, we obtained three factors. We then examined the correlations between the functions served and the three well-being factors. In addition, because we determined that there were significant intercorrelations among the function scores, we examined the independent relations between each function (self, social, and directive) and measures of psychological well-being with partial correlations.

Data Reduction

All 17 well-being scales/subscales were entered into an initial PCA with an oblique rotation (Promax), allowing the factors to be correlated. Following the recommendations of MacCallum, Widaman, Zhang, and Hong (1999), and based on our sample size to variable ratio ($N:p = 6.06$), all scales with an initial communality less than .6 were

dropped from analyses. Based on this criterion, the Family subscale from the MSPSS, and the Social Actualization and Social Coherence subscales from the SWB scale were, dropped and PCA was re-run. This produced a solution of four factors accounting for 74.82% of the total variance. Bartlett's test of sphericity was significant ($\chi^2(91) = 894.25$, $p < .001$) and the KMO measure of sampling adequacy was well above threshold (KMO = .87). We, therefore, considered the data reduction analysis appropriate. Factor loadings are presented in Table 1. The fourth factor was dropped from further analyses as it contained only one variable and several secondary factor loadings. Once factors were determined, we calculated estimates of each factor by summing *Z*-scores for each relevant scale (Floyd & Widaman, 1995). The Integration subscale from the SWB scale was not included in the factor estimates as it was significantly cross-loaded on factors 1 and 4 (Floyd & Widaman, 1995). The three factor estimates used in all further analyses were found to be reliable (Factor 1, $\alpha = .86$; Factor 2, $\alpha = .88$; Factor 3, $\alpha = .77$).

The Purpose in Life, Personal Growth, Contribution, and Generativity scales made up Factor 1. These variables indicated a sense of purpose, a belief that they are valued by their community, and an orientation toward making contributions to their community. As a result, this factor was labeled Purpose and Communion. Self-Esteem, Satisfaction with Life, Autonomy, Environmental Mastery, and Self Acceptance were grouped under Factor 2. These variables indicated a positive self evaluation and a sense that the individual is capable. We labeled Factor 2 as Positive Self View. Finally, Factor 3 contained the scales Positive Relations, and the Social Support subscales for Friends and Significant Others. These scales all suggested a sense that the relationships an individual has are positive, reliable, and supportive. We labeled Factor 3 Positive Relationships.

Relations Between Memory Function and Psychological Well-being

A summary of the means and standard deviations for each function questionnaire separated by event type is provided for descriptive purposes in Table 2. The main aim of this study was to assess the relations between autobiographical memory functions and psychological functioning. Therefore, we examined the correlations between participants' ratings of memory function and the three factors of psychological well-being. Results, split by event type, are summarized in Table 3. For single events, all three functions were significantly related to Purpose and Communion and Positive Relationships, but not to Positive Self View. For recurring events, only the social function significantly correlated with psychological well-being, specifically Purpose and Communion and Positive Relationships.

Following bivariate correlations, we examined the intercorrelations between function scores. The results of those intercorrelations are summarized in Table 4. Results indicated significant intercorrelations between functions, and that the pattern of relations did not differ by event type. Following the observation of significant intercorrelation between function, we conducted a series of partial correlations to determine each functions correlation with psychological well-being independent of the other functions. Results are summarized in Table 5. For the single events, all significant correlations in the bivariate analyses were no longer found to be significant, with the exception of the social function's correlation to Positive Relationships. For recurring events, partial correlations revealed significant relations between the social function and all three well-being factors, but no other significant relations.

Discussion

In this study we provided the first support for the prediction that the use of autobiographical memories to serve self, social, and directive functions relates to psychological well-being. Our results suggested that individuals who use their memories of single events to serve the self, social, and/or directive functions also experience higher levels of Purpose and Communion and Positive Relationships. Individuals who reported using their recurring event memories for high levels of the social function also reported higher levels of Purpose and Communion and Positive Relationships. When we examined partial correlations for recurring events the relations between the social function and the well-being factors remained stable, and even expanded to include Positive Self View. However, when we examined partial correlations for single events the relations between function and well-being diminished, suggesting a potential additive effect of functions served. We also found significant intercorrelations among the functions of autobiographical memory. This pattern, unlike the relations to well-being, did not differ across event types.

Our overall prediction, that individuals who use their memories to serve some function(s) will report high levels of psychological well-being, was supported, but our specific hypotheses about each function were only partially confirmed. The self function did significantly correlate with the Purpose and Communion factor, which most closely captures McAdams (1993; 1996) hypothesis about the role autobiographical memory plays in developing a sense of purpose and meaning to one's life. However, this was only true for single events.

As predicted, the social function was significantly correlated with an individual's sense that they have positive and supportive relationships in their lives. This was true for

both the single and recurring event memories, and remained so even after controlling for the other functions in the partial correlation analysis. We did not predict that the social function would also be correlated to a sense of purpose or positive self perception, but this is what we found. For single and recurring events the social function was significantly correlated to Purpose and Communion (though inconsistent across bivariate and partial correlation analyses). These results may stem from the specific scales included in the larger factor. The communion dimension of factor 1 suggested a sense that the individual wants to be close with, and contribute to, their community. This is likely a secondary feature of the social function of autobiographical memory. Arguments for the benefits of the social function of autobiographical memory suggest that sharing and creating a personal history in a community likely increases resources and support (Nelson, 1993). The social function may not be just about receiving support, but it may also increase pro-social behavior, and thus a sense of Purpose and Communion.

We did not find support for our prediction that the directive function would be related to positive self perception. Instead, we found that the directive function was related to Purpose and Communion and Positive Relationships for single event memories, but found no relations for recurring events. Much like our findings with the social function, it is possible that the Purpose and Communion factor indirectly captures some features of the directive function. Specifically, a sense of purpose may, in part, be facilitated by the use of specific memories to help guide behavior/decision making relevant to that purpose. For example, one participant scoring high on Purpose and Communion and directive function for a single event memory described how that event led to his decisions to attend a university (directive function) and pursue a high paying career (purpose) so that he can

share it with friends (communion).

Autobiographical memory functions were generally not related to Positive Self View. Pillemer (2009) suggested that emotion regulation has been a potentially overlooked function of autobiographical memory (although we note that this function has been well researched in the developmental literature, demonstrating that maternal reminiscing with young children serves to help children regulate their emotions, see Fivush, Haden & Reese, 2006, for a review). This potential function might have been related to the Positive Self View factor, as it is likely an important feature of maintaining positive affect and self view. There is some empirical support for the hypothesis that adults use positive autobiographical memories to help regulate and decrease negative moods (*e.g.* Josephson, Singer, & Salovey, 1996; see Watkins, 2008, for a review of costs and benefits). Future research on the functions of autobiographical memory would be well served by the inclusion of, or investigation of the role autobiographical memories play in, emotion or mood regulation.

The partial correlation results also raised several questions. For the single events, the pattern of bivariate correlations nearly completely disappeared. This may suggest that the functions themselves reflect some meaningful latent component, but there are multiple reasons not to follow this explanation. First, there is a fair amount of research to suggest that the functions of autobiographical memory do not reflect a single latent component. For example, as described in the introduction, Bluck et al. (2005) found that a factor analysis on a set of questionnaire items produced independent factors matching well with the hypothesized self, social, and directive functions. As well, Waters and Fivush (*submitted*), and Waters et al. (*submitted*), found that the self and social functions

fluctuated in opposite directions across event type, which does not suggest a single latent component. Further, research suggests that the cognitive abilities required for each function may have different developmental trajectories (Habermas & Bluck, 2000). Instead of representing an underlying construct, we suggest that there may be an interaction or additive effect between the functions served and their relation to psychological well-being. That is, the more we use our memories in a functional way, the better off we are.

For the recurring events, our findings suggested that the greatest benefits are associated with the social function. This fits with Waters et al.'s (*submitted*) argument that recurring events are better suited to convey information about the development and value of social relationships, and for creating a sense of a shared history. Further it is supported by evidence from the developmental literature focusing on the role of family reminiscing in creating a shared history and sense of family cohesiveness (Bohanek, Marin, Fivush & Duke, 2006; Fivush, Bohanek & Zaman, 2010). This feature of recurring events may produce more positive affect and enhanced closeness during joint reminiscing, or private recollection, and thus a greater sense of positive and meaningful relationships in one's life.

As this study is the first to demonstrate relations between the functions of autobiographical memory and psychological well-being, we suggest several limitations and future directions. We note that the conclusion from this study would benefit greatly from a replication of the findings reported here. The well-being factor structure obtained in this study needs to be replicated as well. It may also be beneficial to include measures that more directly relate to the directive function (*e.g.* measures of problem solving

ability or perceived social competence), or even an assessment of an emotion regulation function. We further note that the study is correlational. We do not know whether high levels of well-being facilitated the reports of autobiographical function, or if using autobiographical memories in more functional ways facilitated well-being. As the first study to examine this question we have established these relations, but future research needs to establish the direction of influence.

Several questions about the development of the cognitive abilities underlying the functions of autobiographical memory remain. Using our memories to serve specific functions involves fairly advanced cognitive and meta-cognitive abilities. Several researchers have examined the development of these types of cognitive skills, in terms of self (Habermas & Bluck, 2000) and directive (Fivush, 1984) functions. However, little research exists on the development of the ability (or propensity) to use autobiographical memories to serve a social function (but see Nelson & Fivush, 2004). Future research examining the development of the cognitive abilities that underlie the self, social, and directive functions may help us understand how we learn to use our memories in everyday life. As noted earlier, an examination of other potential functions and their relations to psychological well-being would greatly improve our understanding of the scope, and role, autobiographical memory plays in everyday life and psychological adjustment. Some research suggests that using traumatic events to define self is particularly detrimental to psychological adjustment (Boals, Steward, & Schuettler, 2010). Our understanding of how the functions contribute to psychological well-being may benefit from considering specific types of emotional events (*e.g.* loss or abuse). Finally, some research suggests that individuals are not fully aware of the functions their

memories serve (Kuwabara & Pillemer, 2010), and that explicit ratings of the functions via questionnaire may be limited (see Pillemer, 2009, for a full discussion). Future research examining the functions served by autobiographical memories should attempt to develop less explicit assessments of the functions of autobiographical memory (see Waters et al., *submitted*, for an example of this).

In summary, individuals who reported using their autobiographical memories of single and recurring events reported higher levels of psychological well-being in terms of Purpose and Communality and Positive Relationships. This finding provided the first evidence to suggest that how we use our memories in everyday life has important consequences, and furthers our understanding of autobiographical memory from an ecological perspective.

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Table 1

Factor Loadings for Well-being Measures Using PCA with Promax Rotation

	Factor 1	Factor 2	Factor 3	Factor 4
Rosenberg Self-Esteem		.875		
Satisfaction with Life		.806		
Psychological Well-being				
Autonomy		.818		
Environmental Mastery		.683		
Self Acceptance		.742		
Positive Relations			.406	
Purpose in Life	.658			
Personal Growth	.832			
Perceived Social Support				
Friends			.931	
Significant Other			.937	
Social Well-being				
Contribution	.935			
Acceptance				.910
Generativity	.773			

Table 2

Means and Standard Deviations for Function Questionnaires by Event Type

	Single Events		Recurring Events	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Self	3.72	.81	3.48	.84
Social	3.81	.79	4.25	.68
Directive	3.59	.81	3.16	.94

Note. All scale items ranged from 0-7, *n*'s ranged from 100-102.

Table 3

Bivariate Correlations Between Functions and Psychological Well-being Factors by Event Type

	Single Events			Recurring Events		
	<i>Purpose and Communion</i>	<i>Positive Self View</i>	<i>Positive Relationships</i>	<i>Purpose and Communion</i>	<i>Positive Self View</i>	<i>Positive Relationships</i>
Self	.30^{**}	.06	.21[*]	.08	-.02	.11
Social	.27^{**}	.06	.36^{***}	.30^{**}	.06	.28^{**}
Directive	.29^{**}	-.05	.25[*]	.04	-.10	.05

Note. n's ranged from 99-102. ^{*} $p < .05$, ^{**} $p < .01$, ^{***} $p < .001$

Table 4

Intercorrelations Between Functions by Event Type

	Single Events			Recurring Events		
	Self	Social	Directive	Self	Social	Directive
Self	--	--	--	--	--	--
Social	.49^{***}	--	--	.45^{***}	--	--
Directive	.72^{***}	.43^{***}	--	.81^{***}	.43^{***}	--

Note. *n*'s ranged from 100-102. ^{***} *p* < .001

Table 5

Partial Correlations Between Functions and Psychological Well-being Factors by Event Type

	Single Events			Recurring Events		
	<i>Purpose and Communion</i>	<i>Positive Self View</i>	<i>Positive Relationships</i>	<i>Purpose and Communion</i>	<i>Positive Self View</i>	<i>Positive Relationships</i>
Self ^{bc}	.10	.14	-.03	.02	-.01	.06
Social ^{ac}	.14	.05	.29**	.31**	.25*	.24*
Directive ^{ab}	-.16	.09	.11	-.08	-.14	-.10

Note. *n*'s ranged from 95-96. ^a controlling for self function; ^b controlling for social function; ^c controlling for directive function. * $p < .05$, ** $p < .01$.

Relations Between Narrative Coherence and Psychological Well-being:
Moderation by Function Served

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Abstract

Dating back to Freud it has been a broadly held, yet surprisingly understudied, assumption in psychology that the ability to construct a coherent account of personal experience is in some way related to healthy psychological functioning. We tested this assumption by examining relations between narrative coherence of personally significant autobiographical memories and three psychological well-being factors (Purpose and Communion; Positive Self View; Positive Relationships). We also examined the potential moderation of the relations between coherence and well-being by assessing the functions served by those memories (self, social, and directive). We collected two autobiographical narratives of personally significant events from 103 undergraduate students and coded them for coherence and function. Results confirmed the long held assumption that the ability to construct coherent autobiographical narratives is related to psychological well-being. Further, we found that this relation was moderated by the self function, for the Purpose and Communion well-being factor.

Keywords: memory, function, narrative, self, social, directive, well- being

Relations Between Narrative Coherence and Psychological Well-being:
Moderation by Function Served

As Freud (1905; 1953) famously noted in his case study of Dora: “The patient’s inability to give an ordered history of their lives ... is not merely characteristic of the neurosis. It also possesses great theoretical significance” (pp.16) and that it is a “theoretical aim to repair all the damage to the patient’s memory” (pp.18). But like many of Freud’s theoretical arguments through history, this claim has been widely accepted with little empirical evidence to support it. Researchers have made the assumption that the ability to tell coherent narratives of one’s life is a critical feature of healthy psychological development and functioning (*e.g.* McAdams, 1993). Further, the absence of coherent autobiographical narratives is assumed to signal pathology (*e.g.* Williams, Barnhofe, et al., 2007).

This assumption cuts across broad areas of research including, autobiographical memory (*e.g.* Baerger & McAdams, 1999), trauma and PTSD (*e.g.* Tromp, Koss, Figueredo, & Tharan, 1995), and clinical intervention (*e.g.* White & Epston, 1990). To date however, there has been only one investigation into this assumption. Baerger and McAdams (1999) found significant relations between the overall coherence of participants’ life stories and well-being. Yet the majority of research on autobiographical memory, and self-defining events, has focused on memories of single episodes, not entire life stories. No study has directly investigated relations between coherence of specific autobiographical memories and well-being. Studies that come closest to examining coherence *per se* stem from the expressive writing literature, in which participants are asked to write about stressful events of their lives over several days. Participants who

engage in this form of expressive writing subsequently show higher levels of psychological well-being than control participants writing about mundane topics, or non-writing controls (see Pennebaker & Chung, 2011, for a review). Individuals who use more words indicative of coherence (*e.g.*, before, after, because, therefore) show better outcomes than individuals who use fewer of these words. However, as Reese, Haden, Baker-Ward, Bauer, Fivush, and Ornstein (2011) argued, word count schemes may not capture the overall coherence of a narrative. Reese et al. (2011) defined narrative coherence as the inclusion of three basic elements; theme, context, and chronology. Theme involves the development, maintenance, and resolution of a specific topic; context refers to the inclusion of specific time and place information to locate the event; chronology refers to the extent to which the temporal order of actions and events is discernible.

Rather than focusing on coherence, research has examined relations between autobiographical narrative “meaning-making” and well-being. Although there is no fully agreed upon definition of meaning-making, the literature suggests that meaning-making within autobiographical memory is accomplished through the use of internal states language describing thoughts and emotions (Fivush & Baker-Ward, 2005; Pennebaker & Chung, 2011), and through reflection about the self, relationships, and the world (McLean & Pratt, 2006; see Fivush, Bohanek, Zaman, & Grapin, *in press*, for a full discussion). For example, more expression and explanation of emotion in autobiographical narratives of positive events was related to higher levels of psychological well-being in an adolescent sample (Bohanek, 2006). McLean and Pratt (2006) found that more sophisticated meaning-making (*i.e.* connecting the memory to an

understanding of self) was related to identity maturity, generativity, and optimism.

McLean, Breen, and Fournier (2010) found that meaning-making predicted higher levels of psychological well-being in late adolescence.

Recent research suggests that individuals use “meaning-making” in their autobiographical memories to serve three basic functions, self, social, and directive. The self function refers to the use of autobiographical memories to help understand our selves and to create a stable and enduring representation of our selves over time (*e.g.* Bluck, 2003; Wilson & Ross, 2003). The social function involves using autobiographical memory to create and maintain intimacy through sharing personal memories, as well as creating a stable representation of a shared history between individuals (Bluck, Alea, Habermas, & Rubin, 2005; Fivush, Haden & Reese, 1996; Waters, Bauer, & Fivush, *submitted*). The directive function refers to the use of specific autobiographical memories to guide decision making and help navigate difficult situations (Krans, Näring, Becker, & Holmes, 2009; Pillemer, 2003).

Early work examining the self, social, and directive functions of autobiographical memory has focused on demonstrating that participants use their memory along these lines. For example, Bluck et al. (2005) asked participants to complete a questionnaire with a variety of items related to the self, social, and directive functions and examined the factor structure produced by those items. Results confirmed the existence of four independent functions; one self, two social (creating and nurturing relationships), and a directive function. Alea and Bluck (2007) asked participants to recall memories about their romantic partner and examined changes in feelings of intimacy with that partner. They found that recalling relationship events produced increases in feelings of warmth

and closeness, suggesting that those memories served a social function. Kuwabara and Pillemer (2010) found that undergraduate students who were prompted to recall memories associated with their current school were more likely to give a donation to that school rather than another charity, compared to controls, suggesting a directive function.

Functions and Well-being

Beyond demonstrating that memories are used in functional ways, researchers have long argued that the autobiographical memories functions facilitate adaptive behavior and development. In terms of the self function, McAdams (1985; 1993; 1996) argued that we use autobiographical memories to construct our identities and a sense of purpose/meaning in our lives, critical features of psychological well-being and adjustment (Keyes & Magyar-Moe, 2003; Ryff, 1989; Ryff & Keyes, 1995). In terms of the social function, Nelson (1993) proposed that sharing autobiographical memories creates a supportive social network which facilitates emotional and psychological, which likely contributes to increased psychological well-being. In terms of the directive function, Brown and Kulik (1977) suggested that memory for emotional intense events may be valuable as they likely inform behavior, allowing us to avoid negative outcomes in the future (directive function; see Pillemer, 2003 for full discussion). The use of autobiographical memories to help navigate difficult circumstances likely has strong implications for positive self perception, a critical feature of several models of psychological well-being (see Keyes & Magyar-Moe, 2003 for a full discussion).

In general, the research reviewed above focuses on what, and what kind of (self, social, directive), meaning is made and largely ignores the question of coherence. Thus our major aim for this research was first, to directly examine relations between the

coherence of specific autobiographical narratives and well-being; and second, integrate research on function with narrative coherence, and examine the contributions and interactions of each to psychological well-being.

We collected autobiographical narratives from undergraduate students and coded them for coherence on a recently developed and well validated coding scheme (Reese et al., 2011). Narratives were also coded for meaning-making for the three functions of autobiographical memory, self, social, and directive. In order to provide a comprehensive assessment of psychological well-being we employed a wide variety of scales aimed at three aspects of well-being: 1) purpose and meaning; 2) positive emotion/happiness; and 3) positive social relationships. We predicted that narrative coherence would be positively related to each of these domains of psychological well-being. Further, we predicted that the relation between coherence and psychological well-being would be moderated by the function served. Specifically (1) based on McAdams (1985; 1993; 1996), the self function would moderate the relation between coherence and purpose/meaning (2) based on Nelson (1993), the social function would moderate the relation between coherence and positive relationships and, (3) based on Pillemer (2003), the directive function would moderate the relation between coherence and positive affect.

Method

Participants

103 undergraduate students (56 females) were recruited from 4 introductory level social science courses at a mid-sized private university, and given extra credit by their instructor for their participation. 41 participants self-identified as Caucasian, 32 as Asian, 16 as African American/Black, 4 as South Asian, 2 as Hispanic, and 8 did not

provide ethnicity information, or described themselves as multi-racial. Participants ages ranged from 18-28 ($M = 18.87$, $SD = 1.41$). All participants gave informed consent as approved by the Institutional Review Board.

Procedure

The data were collected as part of a larger study during the regularly scheduled meeting time of four undergraduate classes, with the instructor's permission. Only those students who signed informed consent participated. Of the 109 students who received extra credit for attending the data collection sessions, six asked that their data not be used for research. These workbooks were destroyed following data collection.

Each group consisted of roughly 25 participants who were seated in a 45-person university lecture hall. As each participant arrived they were given a narrative workbook and instructed to write narratives about several personally significant events from their lives. For more information on the larger study please contact the authors. Participants were also asked to complete two sets of well-being questionnaires, one set to measure well-being in terms of self evaluation, and the other to measure the quality and functioning of social relationships. Participants were given 60-90 minutes to complete the workbook. The content of the booklets was counterbalanced.

Narrative elicitation and coding. Participants were asked to write two narratives about highly significant events in their lives, and were encouraged to provide as much detail as possible about each. All narratives were transcribed verbatim from the written workbooks into word documents, which were then spot checked for accuracy before coding. Narratives were coded in two ways. First, narratives were coded for coherence based on Reese et al.'s (2011) coding scheme. Second, the self, social, and directive

functions were coded according to Waters et al.'s (*submitted*) autobiographical memory functions coding scheme.

Narrative coherence. Narrative coherence was coded along three separate dimensions, theme, context, and chronology (Reese, et al., 2011). Reese et al., (2011) argued that theme, context, and chronology each represent a theoretically, and developmentally, independent aspect of narrative structure, each being central to overall narrative coherence. As a result, each dimension was coded separately along a 0 to 3-point scale, 0 being the absence of the characteristics of the particular dimension of coherence, and 3 indicating that all of the characteristics of that dimension of coherence are present in the narrative. These scores were then summed to create an overall coherence score that could range from 0-9. Thematic coherence was defined as the extent to which a clear topic is introduced, developed, and resolved; context as the extent to which the narrative provides specific time and place information; and chronology as the level of temporal sequencing in the narrative. Reliability for each coherence scale was established between two independent coders on a subset of 60 narratives (14.7%). Reliability analysis for each dimension of coherence produced alphas of .89 for theme, .98 for context, and .95 for chronology. Following reliability coding the remaining narratives and questionnaires were coded by the reliable coders independently.

Functions. Each narrative was coded on three 4-point scales (Table 1) assessing the expression of self, social, and directive functions developed by Waters et al. (*submitted*). The self coding scheme focuses on content related specifically to aspects of increased self understanding, growth, and/or changes in personal goals or perspectives contained in the narrative. The social function scheme focused on narrative content that conveys a sense

of valuing, or developing valuable social relationships. The directive function scheme scored narrative content that described changes specifically to behavior resulting from the events contained in the narrative. Each narrative received a score on self, social, and directive function scales. Each scale was then summed across the two events to create self, social, and directive score for each participant.

Reliability was established between two independent coders on a subset of 69 narratives (17%). The intraclass correlation on the narrative measures of self, social, and directive produced alphas of .87, .90, and .86 respectively. Following reliability the remaining narratives were divided between the two coders and coded independently.

Measures: Well-being and self

Well-being derived from a positive self image, individual accomplishments, and positive functioning, was assessed using three well validated and reliable questionnaires: 1) Satisfaction With Life Scale (Diener, Emmons, Larson, & Griffin, 1985); 2) Rosenberg Self-Esteem Scale (Rosenberg, 1965); and 3) Psychological Well-Being Scale (Ryff & Keyes, 1995).

Satisfaction With Life scale. Diener et al. (1985) developed this scale to assess an individuals' satisfaction with their life as a whole. This brief questionnaire includes five Likert-type items rated on a 1 to 7 scale (*e.g.* "In most ways my life is close to ideal"). This scale has demonstrated good discriminant validity from other measures of well-being, and has been established as a reliable measure of well-being (Pavot & Diener, 1993; 2008).

Self-esteem. Rosenberg (1965) developed this scale to assess individuals' positive/negative view of themselves. The questionnaire includes 10 statements that

participants are asked to rate from 1 to 4, “4” being strongly disagree, and “1” being strongly agree (*e.g.* “On the whole, I am satisfied with myself”). This scale has well established test-retest reliability, concurrent, predictive, and construct validity (Rosenberg, 1979).

Psychological Well-Being. Ryff and Keyes (1995) developed this scale to assess six theoretically distinct well-being constructs: Autonomy, Environmental Mastery, Personal Growth, Purpose in Life, Self Acceptance, and Positive Relations. The 54 item Likert-type scale is well validated for both construct and predictive validity (Ryff & Keyes, 1995). Items include “I feel confident and positive about myself” (Self Acceptance item), “I have a sense that I have developed a lot as a person over time” (Personal Growth item).

Measures: Well-being and social relationships/functioning

Well-being derived from positive appraisal of one’s social relationships and functioning was assessed using three well validated and reliable questionnaires: 1) Multidimensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet, & Farley, 1988); 2) Social Well-Being Scale (Keyes, 1998); and 3) Loyola Generativity Scale (McAdams & de St. Aubin, 1992). These measures were selected to capture well-being in a more social context/domain within two broad categories, hedonic and eudaimonic (Keyes & Magyar-Moe, 2003).

Perceived Social Support. Zimet et al. (1988) developed the Multidimensional Scale of Perceived Social Support (MSPSS) in order to assess an individual’s appraisal of the adequacy of their social support in three domains of personal relationships; friends, family, and romantic partners. The 12-item Likert-type scale yields three subscale

scores, one for each domain of personal relationships. These subscales have demonstrated good reliability, construct validity, and subscale reliability (Zimet et al., 1988; Zimet, Powell, Farley, Werkman, & Berkoff, 1990).

Social Well-Being Scale (SWB). The 50-item Social Well-Being Scale developed by Keyes (1998) was designed to assess five theoretically proposed dimensions of social well-being based on the kinds of tasks encountered by individuals in their social networks and communities. The five subscales include: 1) Social Integration, 2) Social Contribution, 3) Social Coherence, 4) Social Acceptance, and 5) Social Actualization. These scales have been well validated and show strong convergent and discriminant validity (Keyes, 1998).

Loyola Generativity Scale (LGS). Generativity refers to both an individual's positive view of their relationship with their community, but also a motivation to give back to that community. The LGS assesses generativity by asking participants to rate 20 statements on a scale of 0-3 on how well statements apply to the individual (*e.g.* "I try to pass along the knowledge I have gained through my experiences"). This scale has shown good retest reliability, construct validity, and relations to autobiographical narratives (McAdams & de St. Aubin, 1992).

Results

Our analyses aimed to address two major questions: 1) Are narrative coherence and/or the functions of autobiographical memory related to psychological well-being? 2) Is the relation between narrative coherence and psychological well-being moderated by the functions served by those memories? To address these questions our analyses first focused on data reduction for the well-being measures included in this study using

principle components analysis (PCA). To foreshadow, we obtained three factors. We then examined the correlation between narrative coherence and those three well-being factors. We then tested for moderation effects of self, social, or directive function, on the relations between coherence and psychological well-being.

Data Reduction

All 17 well-being scales/subscales were entered into an initial PCA with an oblique rotation (Promax), allowing the factors to be correlated. Following the recommendations of MacCallum, Widaman, Zhang, and Hong (1999), and based on our sample size to variable ratio ($N:p = 6.06$), all scales with an initial communality less than .6 were dropped from analyses. Based on this criterion, the Family subscale from the MSPSS, and the Social Actualization and Social Coherence subscales from the SWB scale were dropped and PCA was re-run. This produced a solution of four factors accounting for 74.82% of the total variance. Bartlett's test of sphericity was significant ($\chi^2(91) = 894.25$, $p < .001$) and the KMO measure of sampling adequacy was well above threshold (KMO = .87). We, therefore, considered the data reduction analysis appropriate. Factor loadings are presented in Table 2. The fourth factor was dropped from analyses as it contained only one variable, and several secondary factor loadings. Once factors were determined, we calculated estimates of each factor by summing Z-scores for each measure contained within that factor (Floyd & Widaman, 1995). The Integration subscale from the SWB scale was not included in the factor estimates as it was significantly cross-loaded on factors 1 and 4 (Floyd & Widaman, 1995). The three factor estimates used in all further analyses were found to be reliable (Factor 1, $\alpha = .86$; Factor 2, $\alpha = .88$; Factor 3, $\alpha = .77$).

The Purpose in Life, Personal Growth, Contribution, and Generativity scales made up Factor 1. These variables indicated a sense of purpose, a belief that they are valued by their community, and an orientation toward making contributions to their community. As a result, this factor was labeled Purpose and Communion. Self-Esteem, Satisfaction with Life, Autonomy, Environmental Mastery, and Self Acceptance were grouped under Factor 2. These variables indicated a positive self evaluation and a sense that the individual is capable. We labeled Factor 2 as Positive Self View. Finally, Factor 3 contained the scales Positive Relations, and the Social Support subscales for Friends and Significant Others. These scales all suggested that the relationships an individual has are positive, reliable, and meaningful. We labeled Factor 3 Positive Relationships.

Relations Between Narrative Variables and Psychological Well-being

To test the hypothesis that narrative coherence and the functions of autobiographical memory would be related to psychological well-being we ran a series of bivariate correlations. The results are summarized in Table 3. Narrative coherence was significantly related to both Purpose and Communion and Positive Relationships, and was marginally related to Positive Self View. The functions were not related to the well-being factors.

Moderation Effects

Following the correlational analyses we tested the hypothesis that the functions an autobiographical memory serves may moderate the positive relation between narrative coherence and psychological well-being. Based on previous literature, we predicted that the self function would moderate the relation between coherence and Purpose and Communion, while the social function would moderate the relation between coherence

and Positive Relationships. Further, we predicted that the directive function would moderate the relation between narrative coherence and Positive Self View. Narrative coherence and the self, social, and directive scores were all centered, then an interaction term was calculated for narrative coherence and each function. We then examined potential moderation effects of the functions on the relations between coherence and well-being using multiple regression. Results are summarized in Table 4. The self function significantly moderated the observed relation between narrative coherence and Purpose and Communion. However, there was no evidence to suggest moderation by the social or directive functions.

Discussion

The results largely supported the long standing, yet surprisingly unexamined, assumption that the ability to tell coherent autobiographical narratives is related to psychological well-being. Further, our data suggested that *what* we are being coherent about is also critical (*i.e.* the self function moderated the relation between coherence and Purpose and Communion). While our results supported the prediction that coherent autobiographical narratives focused on self-definition would be related to well-being in terms of a sense of purpose, our other moderation predictions were not supported. Nevertheless, our results shed light on a long standing assumption and have broad reaching implications for future theoretical and empirical endeavors.

We found that narrative coherence was related to psychological well-being in three broad domains. As has long been argued, this suggests that the ability to tell coherent autobiographical narratives of personally significant events is related to healthy psychological adjustment. Further, our results suggested that narrative coherence is not

associated merely with the absence of negative symptoms (*i.e.* depression; Baerger & McAdams, 1999), but significantly related to positive dimensions of well-being (*i.e.* Purpose and Communion, Positive Self View, and Positive Relationships). Although these data were correlational, and therefore direction of effect cannot be determined, we point to the expressive writing literature which finds that increases in linguistic markers of coherence in narratives about emotional events predicts increases in psychological well-being months later (see Pennebaker & Chung 2011, for a review). This suggests that the direction of effects is from narrative to well-being, and not the other way around.

The significant moderating effect of the self function on the relation between narrative coherence and Purpose and Communion further suggested that, at least for late adolescence, the beneficial ability to construct coherent accounts of personal experience is enhanced when the focus of the narrative is self definition. The long standing argument that forming a coherent identity is the critical developmental task of adolescence (Erikson, 1968; Habermas & Bluck, 2000) was supported by this result. It appears that those individuals who have created a coherent account of who they are also feel as if they have purpose and meaning in life. Erikson (1968) argued that once an individual has formed and committed to a coherent identity they must then commit to deep and meaningful personal relationships in their mid-twenties. It may be that the social function has not yet become a primary concern and source of fulfilment, and perhaps moderates the relation between coherence and well-being in a later developmental stage. Future research should include a wider age span to begin to map out the development of relations between coherence, function, and well-being.

The methodology and results from this study offers several significant contributions

to current and future research. Currently, the only other study to examine relations between narrative coherence psychological well-being did so using a life story approach. This requires participants to produce a narrative history of their entire lives, something quite difficult up until early adulthood (Habermas & Bluck, 2000). Our approach, however, is amenable to samples across development as the coherence measure employed here was developed and validated using developmental samples starting in childhood. This provides the opportunity to (1) track the relation between coherence and well-being longitudinally beginning early in development and (2) examine the effect of interventions aimed at enhancing narrative coherence of specific events, instead of life stories, as may be of interest to PTSD and trauma researchers. As well, researchers and clinicians may benefit from examining both coherence and function served by autobiographical memories, as we have found a significant moderation effect for the self function (see Boals, Steward, & Schuettler, 2010, for further discussion of this issue).

In summary, this study provided support for the widely held assumption that coherence of autobiographical memories is related to psychological well-being. Further, we presented evidence that, to some extent, the relation between narrative coherence and well-being is moderated by the function served by those memories. Whereas much of Freud's theory may not have stood the test of empirical time, it does seem to be the case that psychological well-being is related to the ability to provide a coherent account of the experiences of our lives.

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Table 1

Narrative Coding Schemes of Self, Social, and Directive Function.

<p><i>Self</i></p>	<p><i>0 – No content suggesting the memory functions to define self or enhance self</i></p> <p><i>1 – Any mention of self enhancing or self deprecation due to reflection or remembering the experience, any mention of similarity or difference of self and other, any labeling of self as a member of a group, identification with an individual or group without further elaboration, identification of personal goals, or explicit mention of personal traits.</i></p> <p><i>2 – Any mention of a turning point, milestone, eye opening experience, change in perspective –OR– elaboration on the content listed in scoring criteria for a “1”</i></p> <p><i>3 – Elaboration on why event/experience was a turning point, milestone, eye opening experience, or an explanation of how an experience led to a change in perspective in relation to self –OR– elaboration of the impact of the event on self or identity –OR- elaboration of change in personal goals or attitude</i></p>
<p><i>Social</i></p>	<p><i>0 – No content suggesting a positive stance or a sense of valuing personal relationships</i></p> <p><i>1 – Any mention that a relationship or tradition is meaningful or valuable without further elaboration –OR– any description of a relationship as helpful –OR– missing an individual or period in a relationship</i></p>

	<p>2 – <i>Minimal elaboration on the meaning or value of a social relationship or tradition –OR– mention of the developmental history of a relationship with a positive or valuing tone (note: do not count event focused elaborations, only code for elaborations on meaning or value of the relationship)</i></p> <p>3 – <i>Extensive elaboration of the value of a social relationship –OR– a description of the developmental history of a relationship with intense positive regard</i></p>
<p><i>Directive</i></p>	<p>0 – <i>No content suggesting a change in behavior as a result of the experience</i></p> <p>1 – <i>Any mention of a change in a specific behavior as a result of the experience –OR– change of behavior tied to a specific location/person/context –OR– behavior changed on a single occasion “so I stopped going to her house” or “as a result I decided to drop calculus”</i></p> <p>2 – <i>Change in specific behavior is generalized to a class of events i.e. “I no longer walk the streets alone at night” –OR– “I am now more careful in swimming pools”</i></p> <p>3 – <i>Change in behavior is generalized to multiple contexts/relationships OR elaboration on the change of multiple behaviors across contexts</i></p>

Table 2

Factor Loadings for Well-being Measures Using PCA with Promax Rotation

	Factor 1	Factor 2	Factor 3	Factor 4
Rosenberg Self-Esteem		.875		
Satisfaction with Life		.806		
Psychological Well-being				
Autonomy		.818		
Environmental Mastery		.683		
Self Acceptance		.742		
Positive Relations			.406	
Purpose in Life	.658			
Personal Growth	.832			
Perceived Social Support				
Friends			.931	
Significant Other			.937	
Social Well-being				
Contribution	.935			
Acceptance				.910
Generativity	.773			

Table 3

Bivariate Correlations Narrative Coherence and Functions to Psychological Well-being Factors

	<i>Purpose and Communion</i>	<i>Positive Self View</i>	<i>Positive Relationships</i>
Coherence	.22*	.19 [†]	.35***
Functions			
Self	.13	-.04	.06
Social	-.01	.00	.01
Directive	.04	.00	.00

Note. n's ranged from 99-102. [†] $p < .10$ * $p < .05$, ** $p < .01$, *** $p < .001$

Table 4

Regression Analysis Examining Moderation of Coherence to Well-being Relation by Function

Purpose and Communion (n = 95)			Positive Self View (n = 97)			Positive Relationships (n = 97)		
Predictor	ΔR^2	β	Predictor	ΔR^2	β	Predictor	ΔR^2	β
Step 1	.061[†]		Step 1	.035		Step 1	.123^{**}	
Coherence		.211[*]	Coherence		.188[†]	Coherence		.351^{***}
Self Function		.120	Directive Function		-.003	Social Function		.033
Step 2	.061[*]		Step 2	.000		Step 2	.000	
Coh*Self		.251[*]	Coh*Directive		.014	Coh*Social		-.012
Total R^2 : .123^{**}			Total R^2 : .036			Total R^2 : .123^{**}		

[†] $p < .10$; ^{*} $p < .05$; ^{**} $p < .01$; ^{***} $p < .001$

General Discussion

Autobiographical memory research has taken an increasingly ecological perspective over the last few decades. Current research suggests that, among other things, we use our memories to serve three basic functions in everyday life: self definition, facilitating social relationships, and directing future behavior (*e.g.* Bluck et al., 2005). That said, the impact of using autobiographical memories in these ways is unknown. Research on the functions of autobiographical memory has been largely descriptive, focusing on establishing reliable functions. This work has been an important first step to better understanding how we use our memories in everyday life. The major aim of this dissertation was to extend previous research by examining relations between the functions of autobiographical memory and several broad domains of psychological well-being. A secondary aim of this research was to integrate work on memory functions with work suggesting that autobiographical memory is composed of more than just single, unique, events (Barsalou, 1988). Thus, I examined the functions served by autobiographical memories for both single and recurring events.

In the first paper, I replicated and extended Waters et al. (*submitted*) in a larger undergraduate sample showing that single and recurring events differ in terms of the functions they serve and in narrative structure. In the second paper, I presented evidence showing that individuals who report using their single and recurring event memories to serve self, social, and/or directive functions report higher levels of psychological well-being. In the third paper, I demonstrated that the relations between narrative coherence and psychological well-being may be moderated the functions of autobiographical memory. I will discuss the findings from each paper independently, followed by some general conclusions, and a discussion of future directions and limitations.

Paper 1: Structure and Function

As predicted, the first paper largely replicated and extended Waters et al. (*submitted*). I found that single and recurring events differed on a variety of variables assessing narrative structure and function. In terms of narrative structure, single events contained significantly more first person singular pronouns, past tense verbs, negative emotion terms, and were more thematically and chronologically coherent. Recurring events contained proportionally more first person plural pronouns, present and future tense verbs, cognitive terms, and spatio-temporal terms. In terms of function, single events served more of a self and directive function on both narrative and questionnaire measures, while recurring events served more of a social function for both narrative and questionnaire measures.

These findings provided an important replication of Waters et al.'s (*submitted*), and lend support to their arguments for the importance of examining multiple event types in autobiographical memory. While the SMS model presented by Conway and Pleydell-Pearce (2000) allowed for the inclusion of recurring events, they did not discuss the potential differences embodied by these event types, and how they interact with other aspects of the model outside of autobiographical knowledge. Aside from structural differences in the organization of single and recurring events, which are meaningful in their own right, these findings have implications for the SMS model. The differences in narrative structure and function suggest that, during retrieval, single and recurring events interact with the working self and the long-term self in different ways. The SMS model described the reconstructive process of memory retrieval as being guided by personal goals (Working Self), and incorporating knowledge about the self and the world (Long-term Self). My results suggest that recalling single and recurring events draws upon different goals and knowledge. Single events tended to draw more upon self knowledge

and personal goals, containing a higher proportion of the pronoun “I”, and scoring higher on both measures of the self function. Meanwhile, recurring events seemed to be more closely tied to social knowledge, as they contained more of the pronoun “we” and scored higher on both measures of the social function. Currently, the SMS model does not make a distinction between single and recurring events. My results suggested that these event types are subject to different processes, and cued/retrieved through different pathways. To account for this, the SMS model may require some revision.

As argued in the introduction, a possible explanation for the differences in function for single and recurring events may stem from their temporal scope. Single events, defined here as occurring in a 24 hour period, are thought of as salient and unique events. Single events that are remembered as personally significant likely represent dramatic changes in personal circumstance (*e.g.* news of parents divorce). Recurring events, however, are more representative of stability. Recurring events contain mostly the invariant features of a recurring class of experiences. The majority of participants in this study were university freshman, and the pattern of results may be reflective of their developmental period/stage. As freshmen in their first semester of university, social relationships with family and friends were likely more stable (*e.g.* parents, roommates); while self concept and identity were likely changing and being explored. This interpretation fits with the Eriksonian tradition of personality development (Erikson, 1963; 1968) which describes a series of crisis points across the life span. Most relevant for this sample is what Erikson termed the identity crisis, during which adolescents must explore and commit to a sense of identity. Thus, I would argue that these findings should be interpreted in a developmental context. Single events may serve a significant self function in late adolescence and early adulthood, when identity and self concept are undergoing significant change and exploration; single events may

not always serve the self function at the levels observed in this study. As individuals transition into the workforce, experience dramatic changes in social relationships, and begin establishing families of their own, researchers might observe single events serving more of a social function (*e.g.* marriage proposal or wedding). Similarly, as self concept begins to stabilize, and an identity is committed to, recurring events may shift to serve more of a self function.

As a secondary aim, I sought to examine the convergent validity of the questionnaire and narrative coding schemes. While moderate, I did find significant relations between the two methods of assessing the self, social, and directive functions. The correlations between narrative and questionnaire measures of self and social functions were fairly convincing, while the correlations between the directive function were not as strong. The small relations between directive function measures may have resulted from the relatively low levels of directive function observed in the narratives. That said, the correlations are promising and suggest that the measures of autobiographical memory function are indeed converging on their intended constructs.

Paper 2: Memory Functions and Well-being

Consistent with my predictions, I found that individuals who reported to use their autobiographical memories (single and recurring) in more functional ways also reported higher levels of psychological well-being. This was the first evidence linking the functions of autobiographical memory to psychological well-being. This finding represents a critical step toward understanding how, and why, we may use our memories to serve self, social, and directive functions.

In order to better examine the construct of well-being, I included a wide variety of well-being scales from both the hedonic and eudaimonic traditions of well-being (Keyes & Magyar-Moe, 2003). I found that the selected well-being measures converged on three broad domains: Purpose and Communion, Positive Self View, and Positive Relationships. For single events, all three functions were positively correlated with the Purpose and Communion and Positive Relationships well-being factors. For recurring events, only the social function was significantly correlated to the well-being factors, specifically Purpose and Communion and Positive Relationships.

I observed high intercorrelations between the measures of function, and followed up the initial bivariate correlations with partial correlations. Following partial correlations between each function and well-being factor, controlling for the other two functions, significant correlations between function and well-being were no longer observed for single events. These results may indicate a potential additive benefit of the functions of autobiographical memory. Individuals who were high on one function were likely high on the others, and it seems that this intercorrelation accounts for the relations between the functions and well-being in single events. Interestingly, the partial correlations for the recurring events resulted in more, not less, relations between the social function and the well-being factors. Significant relations between the social function and well-being for the recurring events expanded to include all three well-being factors. This result fit with Waters et al.'s (*submitted*) argument that recurring events are more representative of stability, and may convey more valuable and representative information about social relationships.

My specific hypotheses were only partially confirmed. As suggested by McAdams (*e.g.* 1993), the use of narrative for self definition was related to a sense of purpose, and as predicted

by Nelson (1993; see also Alea & Bluck, 2007) the social function was related to Positive Relationships. The prediction that the directive function would be significantly related to positive self view was not supported.

The intercorrelations between the function scores were remarkably similar by event type, but the relations to the well-being factors were very different. This further supports Waters et al.'s (*submitted*) arguments that autobiographical memory researchers should not assume that single and recurring events are used, or predictive, in the same way. It is important to note that the analyses were correlational, so direction of effects cannot be known. Still, the difference in relations between functions and well-being by event type was suggestive.

Paper 3: Narrative Coherence and Well-being

The hypothesis that the coherence of autobiographical narratives is related to psychological well-being is widely accepted. Currently, there is very little evidence in support of this claim. A literature review revealed only one study examining relations between autobiographical narrative coherence and well-being (Baerger & McAdams, 1999). This study found that individuals who told more coherent life stories also reported lower levels of depression, and higher levels of life satisfaction. The third paper presented in this dissertation was the first to replicate this finding, and provided further evidence of relations between coherence and well-being

My results supported the long held assumption that the ability to tell coherent autobiographical narratives is related to psychological well-being. I found that individuals who told more globally coherent narratives of personally significant single events also reported significantly higher levels of Purpose and Communion, Positive Self View (a trend), and Positive Relationships. I also examined the potential moderation of these relations by the memory

functions served by those events. I predicted that the relation between (1) coherence and Purpose and Communion would be moderated by the self function; (2) coherence and Positive Self View would be moderated by the directive function; and (3) coherence and Positive Relationships would be moderated by the social function. The hypotheses were only partially supported. The self function was a significant moderator of the relation between coherence and Purpose and Communion, but I found no evidence to support the other two moderation hypotheses.

The papers presented here are, in many respects, the first to integrate structural and functional approaches to examining relations between autobiographical memory and well-being. There is some evidence linking memory and well-being that should also be considered. The overgeneral memory phenomenon associated with depression can be thought to reflect an absence of narrative structure/coherence. Depressed patients, relative to controls, tend to have difficulty generating specific event memories during cued memory tasks (see Williams et al., 2007 for a review). Retrieving exclusively general event information would likely result in narratives lacking the kinds of specific chronological, contextual, and thematic information required to construct a coherent narrative. But the researchers examining relations between depression and overgeneral memory have not explicitly looked at coherence in the ways discussed here. A variety of mechanisms have been proposed to explain the overgeneral memory phenomenon including, rumination, avoidance, and limited cognitive resources resulting from the depression. However, these mechanisms fail to explain the positive side of coherence, mainly why narrative coherence may relate to positive adjustment, and why coherent narratives serving a self function are particularly beneficial for well-being in terms of Purpose and Communion. Research on expressive writing may also shed light on the question of if, and why,

narrative coherence is related to psychological well-being. Evidence from this research suggests that increases in linguistic features associated with coherence (see Reese et al., 2011 for a full discussion) during expressive writing seems to produce some positive psychological and physiological benefits (Pennebaker & Chung, 2011). Although conceptualizing coherence differently than in the present research, expressive writing demonstrates a directional relation between coherence and well-being (*i.e.* an increase in coherence produces an increase in well-being). While there is some evidence to suggest a directional hypothesis for the relations between coherence and well-being, the mechanism is still largely unclear. The observation of moderation by the self function (and not the social or directive) does take an important step forward in isolating potential mechanisms for the relation between coherence and psychological well-being. This paper suggested that narrative coherence is important, but what you are coherent about is critical as well.

Conclusions

The results presented here support the argument that autobiographical memory researchers should not overlook the varying event types held in memory, and produced by their participants. Examining phenomena of interest in multiple event types, while arduous, may produce different patterns of results, and lead to a more ecologically valid understanding of autobiographical memory. This is also the first evidence that individuals who use their memories to serve the self, social, and directive function of autobiographical memory report higher psychological well-being. This provides further motivation for researchers to continue to study the functions of autobiographical memory, as there is now evidence of mental health implications. The results also suggest that taking a functional approach can help researchers develop a more nuanced understanding of other psychological phenomenon, in this case narrative coherence.

The papers presented here make several larger contributions to the field of autobiographical memory research, beyond the specific implication discussed above. In the first paper I presented two measures of the functions of autobiographical memory developed for this research (though the CES was borrowed from Berntsen & Rubin, 2006). I also provided some data on the convergent validity of these measures. Hopefully these measures can serve other researchers interested in examining the functions of autobiographical memory from multiple perspectives, including the narrative perspective taken here. In the second paper, I demonstrated that the questionnaires developed to assess the functions of autobiographical memory correlate with well-being measure, mostly, as predicted. Further, I presented an integrative approach to well-being assessment borrowing from Keyes and Magyar-Moe's (2003), and others, discussion of hedonic and eudaimonic well-being. This is not the approach typically taken in research examining relations between memory variables and well-being, with the major focus being on depression and PTSD, and less so on positive functioning. The approach presented here opens the door for memory researchers to study/defining well-being as being more than the absence of psychological distress. The third paper presented a useful methodology for future research. While the functions of autobiographical memory may not always be the major focus of memory research, I have demonstrated that inclusion of information about function may enhance explanatory power, highlight particular pathways of effects, and discredit others. Beyond their current contributions, the papers presented here also open many directions for future research, and contain several limitations that will need to be addressed in order to further substantiate the conclusion made here.

Future Directions and Limitations

The findings described here present several opportunities for future research. There is some question about how well the functions of autobiographical memory translate across cultures (Waters et al., *submitted*). There has been some work examining the functions in northern European samples (*e.g.* Rasmussen & Berntsen, 2009), but no research has attempted to validate the current functions outside of western industrialized societies. Markus and Kitayama (1991) argued that self is viewed as an independent entity in western cultures, while non-western cultures often view the self as interdependent and intertwined with social relationships (but see Matsumoto, 1999 for a critique). This would suggest that the line between the self and social function may be blurred in cultures that take a more interdependent stance on self. Even if the functions of autobiographical memory are the same across cultures, there is the possibility that they do not relate to psychological well-being in the same ways observed here. Individuals who tend to use their memories to serve a high self function may be in conflict with cultural norms and thus rate their well-being as lower, instead of higher, as found here.

In terms of relations to well-being, some research suggests that the direction of the relation between meaning-making variables and psychological well-being differs across development. McLean, Breen, and Fournier (2010) found that in early adolescence meaning-making was negatively related to well-being, but that by late adolescence the relation had reversed and meaning-making was positively related to well-being. This suggests that the patterns of positive relations observed here may differ in earlier age groups. Further, as I argued in paper 3, the social function may become a more prominent source of fulfilment and well-being later in development (Erikson, 1968). Habermas and Bluck (2000) also argue that the ability to reason about our personal experiences, and link them to form larger meaning, is subject to development. This ability emerges in middle childhood and reaches adult levels by late adolescence. The

ability to use autobiographical memories to serve each function may parallel the development of the more general autobiographical reasoning skills discussed by Habermas and Bluck (2000). This might suggest that use of memory to serve the self, social, and directive functions stems from the same underlying cognitive ability (*i.e.* autobiographical reasoning). Further examination of these issues is required to better understand how we come to use our memories functionally and how that relates to well-being across development.

I would also like to acknowledge several limitations of the current research. As discussed above, the sample collected for this dissertation was largely from one age group (adolescents 18-20 years old). The sampling employed here prevents any developmental or directional arguments from being made. As a result, I have relied largely on correlational analyses. Future research would benefit from longitudinal and cross-sectional designs. The replication of relations between coherence and well-being, and the observation of relations between function and well-being, are important first steps toward understanding how autobiographical memory and well-being may be related. However, the mechanism underlying this relation cannot be examined from these data. As well, the valence of the events recalled was not examined. Rasmussen and Berntsen (2009) argued that negative event memories are more often selected to serve a directive function, likely in an effort to avoid negative encounters in the future. The valence of the events selected was not specified, making it difficult to directly address the relation between valence and function. However, this would likely be an important next step. For example, it is unknown what the result would be if negative (or traumatic) events were used to serve a significant self function. There is reason to believe that individuals who select traumatic events to be emblematic of self may also report lower levels of psychological well-being (Schuettler & Boals, 2011), but this is open to further empirical investigation.

Despite these limitations, the results described here present several important contributions of autobiographical memory research. First, I have demonstrated that the inclusion of multiple event types into autobiographical memory research can be fruitful, informative, and produce novel results. Second, I have provided the first evidence for relations between the functions of autobiographical memory and psychological well-being, and opened the door for a line of inquiry into how and why these relations exist. Finally, I showed that not only is narrative coherence an important variable relating to psychological well-being, but that what we are coherent about (*i.e.* self function) is also critical.

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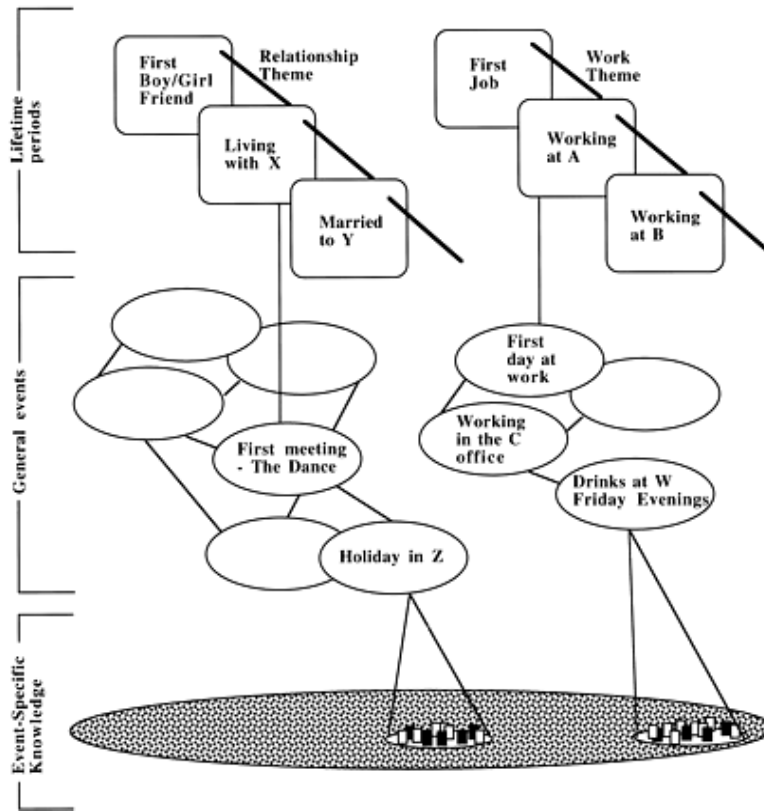


Figure 1. The autobiographical knowledge base (Conway Pleydell-Pearce, 2000).