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by

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The reminiscence effect, in which people aged 40 and over remember more autobiographical memories from between ages 10 to 30 than from adjacent periods, producing a "bump" in lifespan distributions, is a highly robust effect. When it was discovered to occur for highly positive emotional memories, but not negative ones, the cultural life script account of reminiscence was proposed. The cultural life script account asserts that individuals possess scripts for important events in the normative life that structure autobiographical recall. The reminiscence effect is explained by the fact that in life scripts, positive events have highly prescribed timings and cluster between ages 10 and 30, while negative events, which do not have prescribed timings, are more evenly distributed across the lifespan. The life story account outlines additional properties of bump memories. The life story account attributes reminiscence to the differential recall of life story events, i.e., events that provide coherence to one's life story. Four studies are reported testing these accounts. Chapter 2 reports a test of the life script with African Americans. Research suggests that life scripts are highly stable, varying little across cultures. The findings indicate that, overall, the properties of the life script were replicated. However, minor cross-cultural differences similar to those observed in prior research were exacerbated with a minority sample. In Chapter 3, the effect of minority

status on the recall of emotionally negative memories is examined. Contrary to expectations, the findings failed to contradict the predictions of either account of reminiscence. In Chapter 4, the typicality effect is tested with life scripts in an attempt to present an additional class of evidence for their existence. Finally, in Chapter 5, the life story account is tested. The findings support the life story account by showing that the bump occurs for life story, but not non-life story, events. These studies add to our understanding of the cultural life script and life story accounts and the reminiscence effect in autobiographical memory.

Contents

CHAPTER 1

LITERATURE REVIEW

INTRODUCTION

While the study of personal, or autobiographical, memories has a history going back more than 100 years, some of the most substantial contributions to the field have only come as recently as the beginning of the twenty-first century. These developments in reminiscence effect research have resulted in a new, currently burgeoning line of inquiry. The reminiscence effect, originally observed by Rubin, Wetzler, and Nebes (1986), is the tendency for adults age 40 and over to recall disproportionately more memories from between ages 10 and 30, resulting in a "bump" in the lifespan distributions of recalled autobiographical memories. Over the years following this discovery, several accounts of this effect were proposed, with the most prominent current ones being the cultural life scripts (Rubin & Berntsen, 2003) and life story (Glück & Bluck, 2007) accounts. In 2002, the results of a study by Berntsen and Rubin substantially altered reminiscence effect research. In their study, respondents reported personal memories for several emotionally positive and negative events. Surprisingly, the reminiscence effect only occurred for emotionally positive, but not emotionally negative, events. A subsequent study soliciting requests for other forms of highly positive and negative emotional events confirmed this effect (Rubin & Berntsen, 2003). Based on these findings, Berntsen and Rubin (2003) developed the cultural life script account of the reminiscence effect, synthesizing the concept of scripts (Schank & Abelson, 1997) with sociological evidence that cultures have expectations for the timing of major events in the normative life. In the cultural life script account, life scripts

delineate the timing and order of important events structure the recall of personal emotional memories. Rubin and Berntsen hypothesized that cultural life scripts cluster emotionally positive events, which are mostly of a transitional nature, between ages 10 and 30, mirroring the placement of the bump for emotionally positive events in the lifespan in autobiographical recall distributions. To test this claim, Berntsen and Rubin (2004) conducted a study in which the existence of a shared script matching this pattern was demonstrated. Several subsequent studies have gone on to replicate this finding. Since its discovery, investigations dealing with, or based on, the dissociation between distributions of autobiographical memories of opposing valences have become among the key focuses of autobiographical memory and reminiscence effect research, with the cultural life script account being one of the most prominent theoretical perspectives through which they are investigated.

Along with the cultural life script account, one other account has emerged as one of the most prominent explanations of the reminiscence effect and the fact that it occurs for highly positive, but not highly negative, emotional memories. The life story account of reminiscence (Glück & Bluck, 2007), an account complementary to, and compatible with, the cultural life script account, attributes the bump to the differential retrieval of life story events. Life story events are highly consequential, important, emotionally positive life events that provide coherence to one's life story. Whereas the cultural life script account predicts that the bump will be observed primarily for emotionally positive events, the life story account further predicts that it will only occur for life story events, but not non-life story events, even when they are highly emotionally positive. Though limited, a growing body of research is emerging supporting the predictions of the life

story account and, as with the cultural life script account, it currently stands of one of the main focuses of autobiographical memory and reminiscence effect research. In fact, the two are so inextricably tied that investigating one requires addressing the other.

As tests of the cultural life scripts and life story accounts of the reminiscence effect are still in relatively nascent stages, there remain many unanswered questions about them. Moreover, many tests of these accounts have yet to be extended into and confirmed in other situations. The goal of the current dissertation is to address a range of unanswered questions in both accounts and present novel tests of each that will contribute substantially to the fields of autobiographical memory and reminiscence effect research. To that end, four separate, original studies are presented, preceded by a general introduction consisting of a review of autobiographical memory and reminiscence effect research, and followed by a general discussion that assesses the implications of the current studies on the state of these accounts.

Chapter 2 presents the first test of the properties of the life script with a historically unfairly treated minority population. A key component of the life script account is the claim that they invariably represent idealized lives regardless of culture, a property that, in part, contributes to the occurrence of the reminiscence effect only for emotionally positive memories. However, it is quite likely that the stability of this property has not been tested in enough situations (e.g., with different populations) that represent differences on dimensions relevant to the expression of this effect. One such factor might be the minority status of the population being investigated. Thus far, the populations examined in tests of the life script have all been of majority cultures, many of which come from highly homogenous societies, which also tend to have relatively low

income disparities. It may be the case that a test of the life script with a minority population, especially one that has been historically unfairly treated and experiences higher rates of adverse living conditions, experiences a higher lifetime prevalence of emotionally negative events than previously investigated populations. The result may be increases in the amount of negative life events they expect, and a less idealized, or even negative, life script.

Chapter 3 presents a test of the reminiscence effect with African Americans' autobiographical memories of unfair treatment, an emotionally negative memory. One of the main predictions of both the cultural life script and life story accounts is that the reminiscence effect primarily occurs for emotionally positive memories (except in cases of history-graded events, which do not require the structuring of recall by life scripts to produce a bump and may not meet all the criteria for life story events). Evidence that the reminiscence effect occurs for an emotionally negative event such as unfair treatment would likely necessitate a reformulation of the cultural life script and life story accounts to explain it. While the data examined are not directly comparable to most reminiscence effect research because of differences in methodology, they provide a useful platform for discussing the potential implications of minority status on autobiographical recall and the cultural life scripts and life story accounts of reminiscence, as well as the effects of using alternative autobiographical cues. Importantly, the current study represents the sole examination of the reminiscence effect with an unfairly treated minority population and a U.S. minority.

Chapter 4 presents an investigation of the typicality effect with life script information. Thus far, no evidence for the existence of life scripts independent of the

reminiscence bump has been obtained. Ostensibly, classical effects observed with other forms of scripted information, such as the typicality effect, should occur with cultural life script information, if they are indeed scripts that individuals possess. The typicality effect is the tendency for individuals to have superior memory for atypical events in scripted information and to be more likely to recall falsely typical, rather than atypical, events. The findings of Chapter 4 provide modest support of the cultural life script account of reminiscence in that, while the findings from Experiment 1 provide evidence that life scripts are represented in memory, Experiment 2, which was conducted to address potential confounds in Experiment 1, produced mixed results. The findings from Experiment 2 suggest the possibility of an alternative form of knowledge that may be driving typicality effects when dealing with the relationship between emotional valence and lifetime periods.

Finally, Chapter 5 presents a test of the life story account of reminiscence. Life story memories are characterized by several different qualities. Prior research has demonstrated that a dissociation occurs between distributions of life story and non-life story memories when they are identified based on some of their qualities, such as perceived control. However, this effect has not yet been demonstrated with other life story event qualities, such as importance to identity development and importance. In addition to extending findings to novel variables, the current study presents for the first time a test of the life story account in an American sample in a procedure synthesizing elements of a previous test of the life story and cultural life script accounts in a novel procedure.

The format of the current dissertation is as follows: First, a general introduction consisting of a literature review is presented, followed by the four studies, and ending with a general discussion section. Each of the four studies is presented as a standalone article conforming to the American Psychological Association (APA) style manual guidelines for research manuscripts, consisting of an abstract, and introduction, method, results, and discussion sections. As such, some overlap may exist between the general introduction and the introduction sections of each individual study. As a general rule, the literature review in the general introduction provides more in depth coverage and analyses of the extant literature than is possible in the introduction section of a journal article.

REVIEW OF RESEARCH ON TEMPORAL DISTRIBUTION OF AM

1. EARLY RESEARCH ON TEMPORAL DISTRIBUTION OF AM

The reminiscence effect was discovered relatively early in the evolution of the field of autobiographical memory research, which can trace its roots to the earliest chapters of experimental psychology with studies by Ebbinghaus and Galton. However, the study of autobiographical, or *episodic* (Tulving, 1972), memories for one's personal past only reemerged and began anew in earnest in the mid 1970's. One of the main catalysts for this renewed interested was the work of Crovitz and Schiffman (1974), who employed Galton's word cue methodology to elicit autobiographical memories. They obtained 1,745 reports of autobiographical memories and the ages at which they occurred from 98 undergraduate participants, with the goal of examining the retention function (i.e., the curve of the distribution of recalled memories). They concluded that the

frequency of autobiographical memories decreases as a function of the retention interval (i.e., their age since occurrence). However, they were unable to draw any conclusions about the retention function for memories across the lifespan, because of the limitations of their sample, which was comprised entirely of undergraduate students. Robinson (1976) also encountered the same limitation in his study examining the word-cued memories of 24 undergraduate students ranging in age from 18 to 21 years. In a "modified free-association" procedure, word cues for common objects, common activities and various affective states were utilized. Participants produced 1,101 reported memories. Among his main findings were that there was a clear indication of gender differences, in that the distribution of reported memories by females had a greater number of recent events, compared with greater variability that was evident in the distributions produced by the male participants. Moreover, object- and activity-cued memories were reported from more recent periods for females than males. However, there was no significant difference in median age for affective cue memories between males and females, which skewed toward being more recent for both. Robinson also assessed response latency, temporal specificity, and experience type. Females tended to have shorter response latencies than males, but significant differences were only observed for activity terms and object terms, but not for affect terms. An interesting finding was that response times were greatest for memories from the middle lifetime period, with those from the most remote and recent periods being equal, demonstrating a curvilinear relationship between response latency and memory age. With regard to experience type, the most frequently reported memories were accidents and injuries, romantic episodes, and first time experiences. The findings show that contrary to predictions, object and

activity words did not produce affectively neutral responses. Rather, they often were of some type of emotional significance. The findings of his study led Robinson to three main conclusions: (1) there were clear differences between affective and activity and object prompts, (2) there was a reliable gender difference, and (3) there was a clear curvilinear relationship between response latency and age of memory. While influential, the studies by Crovitz and Schiffman, and Robinson were limited in their ability to contribute significantly to the understanding of autobiographical memory across the lifespan by the restricted age ranges of their samples. Subsequent AM research would overcome this limitation.

Several prominent AM studies were carried out after those by Crovitz and Schiffman and Robinson that extended their findings to older samples. One such study was that by Franklin and Holding (1977). Franklin and Holding tested 100 subjects between 25 and 75 years of age who reported memories cued by 50 randomly chosen words. In comparing the average age of memories between five age groups with a range of ten years each, they found that memory age (time since the event) increases as participant age increases, rather than being recalled from a uniform interval across age groups. In addition, response latencies (time from cue to producing a reported memory) did not differ significantly between age groups. Also using a word cue paradigm, Fitzgerald and Lawrence (1984) examined the dates of elicited memories, response latencies, measures of imagery, and of meaningfulness, in four age groups. The results indicated that response latencies and the rate of memory decline over time are stable across age groups. From their findings, Fitzgerald and Lawrence concluded that patterns of remembering are relatively stable across the adolescent and adult age ranges.

Whereas the previous studies examined autobiographical recall in healthy populations, Zola-Morgan, Cohen, and Squire (1983) assessed the remote autobiographical memories of patients with various forms of amnesia, including amnesia due to Korsakoff's syndrome, traumatic brain injury, and electroconvulsive therapy (ECT), which were compared to alcoholic control subjects. In Zola-Morgan et al.'s procedure, participants were read cue words to which they would recall a specific memory from their lives, and estimate the timing of its occurrence. The findings showed that, despite the subjects' impairment on other memory tasks, these amnesiac patients were surprisingly adept at recalling episodic memories, even performing as well as healthy control subjects at several of the tasks. In fact, Korsakoff's patients reported more remote memories as a percentage of total memories reported than alcoholic controls. In comparing episodic and semantic memory deficits, it was found that amnesiac patients had performed as well on the test of remote episodic memory as on tests of remote semantic memory.

While research such as the examples described above utilized samples of varying sizes representing several distinct populations, a few prominent researchers conducted influential studies using themselves as the sole participant. The most noteworthy are the diary studies by Linton (1986) and Wagenaar (1986). Linton recorded her memories on a daily basis for over a decade. Once a month, she would test herself on the recognition and cued recall of randomly selected memories. The measure of recognition was whether she recognized the event as a unique event. The cued recall entailed dating the timing of the event based on three cues describing the event, recorded on the day of its occurrence. Linton also performed an additional task in which on a yearly basis, she would attempt

via free recall to recall as many memories from the prior year as possible. At one point, she also added a task in which she attempted to remember via free recall as many memories as possible from randomly chosen months. Finally, in 1983, she completed a free-recall of as many memories as possible per year from the years 1972 to 1982, with the to-be-recalled years presented in random order. Content analysis of memories demonstrated some interesting findings. Notably, relatively few memories were emotionally negative, and search method had no effect on emotional valence of recalled events. Linton concludes that negative memories "do not appear in temporally cued recall (p. 60)." This was not the case however, for recognition-cued recall findings, which indicated no difference in the rate at which negative memories were lost, compared to positive ones. With regard to the recall of recent memories, Linton found that they were recalled with great accuracy and required fewer cues to be accessed. In Wagenaar's (1986) study, conducted over a six-year span, he collected reports of 2400 events, for each of which four cues were recorded: what the event was (what); who was involved (who); and where and when it occurred. Wagenaar compared the probability of recall depending on various cue combinations and found that the probability of recall depended on the number of cues utilized as well as on the cue type and particular combination. Similar to Linton, Wagenaar found that there was an effect of emotional valence in which emotionally positive (pleasant) events were better recalled than emotionally negative (unpleasant) events.

2. THE DISCOVERY OF THE REMINISCENCE EFFECT

As AM research progressed, several studies were conducted investigating the temporal organization of autobiographical memories, like that by Rubin (1982), which

investigated the retention function. Along those lines, Rubin, Wetzler, and Nebes (1986) made one of the most significant and influential contributions to the AM literature. In their paper, Rubin et al. presented one of the earliest descriptions of the reminiscence effect. In examining the prior findings by Franklin and Holding, Fitzgerald and Lawrence, and Zola-Morgan, Cohen, and Squire, they demonstrated, contrary to expectations of monotonic forgetting with the passage of time, a reoccurring, disproportionate recall of remote or early memories compared with ones that are more recent. When summing the results of the above-mentioned studies together, the effect was even more pronounced. Rubin et al. called this observation the reminiscence effect. The data indicated that adults aged 40 and older produced a nonmonotonically decreasing distribution of memories across the lifespan where subjects recalled an increased number of memories from the lifetime period of approximately 10 to 30 years of age. These findings provided one of the earliest indications of reminiscence in memory and the potential that the retention function for autobiographical memories does not conform to that for normal forgetting in laboratory research. From these results, Rubin et al. proposed a model of autobiographical memory consisting of three components: (1) Childhood amnesia; (2) a retention component to account for the recency effect; and (3) a reminiscence component to account for memories from adolescence and young adulthood. Thus, only a decade after the reemergence of autobiographical memory research, the reminiscence effect was introduced. Subsequently, the reminiscence effect has come to be considered one of the most robust findings in AM literature (Conway & Rubin, 1993; Glück & Bluck, 2007).

REVIEW OF REMINISCENCE EFFECT RESEARCH

1. EARLY ACCOUNTS OF THE REMINISCENCE EFFECT

In the 10 years following the discovery of the reminiscence effect by Rubin, Wetzler, and Nebes (1986), some initial attempts at accounting for the phenomenon were made. However, as should later be made relatively clear, the nature of these accounts differed greatly from those that would dominate in the early Twenty-First Century. Shortly after Rubin et al. introduced the concept of the reminiscence effect, Fitzgerald (1988), whose data were among those analyzed by Rubin, et al., posited some likely accounts of its occurrence. Fitzgerald considered three possible explanations: (1) Event interpretations; (2) cognitive interpretations; and (3) noncognitive interpretations. The event interpretation revolves around a simple premise, that an increased number of memorable events occur in the period of the reminiscence effect, adolescence through young adulthood. While acknowledging that "life events" such as marriages and births occur more often in this period, Fitzgerald discounts this hypothesis because, with the data he was examining, there apparently were not enough of these events to account for the large number of memories observed. The cognitive interpretation takes into account several characteristics of autobiographical memories reported by participants in Fitzgerald's study. Reported memories tended to possess several key characteristics: They were vivid, personally important, frequently rehearsed and were often novel and surprising events experienced with high levels of emotion. While substantially different in several key characteristics, the accounts of the reminiscence effect by Fromholt and Larsen (1991), shared some components of the accounts Fitzgerald proposed, but more closely presaged the later prominent theories that dominate the field currently.

In their study examining the autobiographical recall of persons between 71 to 89 years of age, Fromholt and Larsen examined the episodic memories of both normal and demented patients. However, their procedure differed from many prior studies by not using the word cue methodology. Instead, they asked participants to report important life events. This divergence from prior procedure would immensely affect and guide future research in the field. Findings for both normal and demented patients clearly demonstrated the classic reminiscence effect pattern: (1) A relative dearth of early childhood memories reflecting the period of childhood amnesia; (2) a bump of increased memory recall between 10 to 30 years of age; (3) relatively few memories in the following period; and (4) a recency effect. However, the effect was more pronounced in the normal control subjects. To explain their findings, Fromholt and Larsen suggested that the observed patterns might be explained by sociocultural influences. They pointed to the prevalence of important transitional life events that cluster in the bump period, and the relative lack of those events in the subsequent adjacent period as a potential source of the pattern in the observed distributions. Whereas Fitzgerald's study indicated that only 14% of the bump memories were such events, leading him to dismiss this idea, Fromholt and Larsen considered their findings, which showed that 29% of dated memories from the bump period were of such events, and only 21% were from other types of events, was a sufficient indication that this was a reasonable hypothesis. One point on which Fromholt and Larsen, and Fitzgerald did agree was the potential effect of self-narrative. They conjectured that the rehearsal and maintenance associated with such salient self-defining events could cause them to be sampled with greater frequency. While early accounts proposed by theorists like Fromholt and Larsen and Fitzgerald were beginning

to converge on key points, the volume of research in the area would begin to expand tremendously and cover a wider range of methodologies and theories.

In an example of what could be described as another event-based interpretation (such as that described by Fitzgerald), Jansari and Parkin (1996) offered their account of the bump based on findings they obtained using cue words from Robinson's (1976) study, in which they observed a reminiscence effect in adults between the ages 56 and 60. They suggested that the excess of first experiences in early life might account for the reminiscence effect. Additionally, they found that when constrained in their responses to avoid reporting any recent memories, a reminiscence effect was also observed in participants aged 36 to 40 years old. Jansari and Parkin stated that participants in this age group typically report an excess of recent events, but that by instructing subjects to follow constraints that ameliorate this tendency, they too display reminiscence effects. In a comparison of word-cued and important autobiographical memories, Rubin and Schulkind (1997a) found that for adults aged 70, many more important memories, rather than word-cued memories, were concentrated in the lifetime period of 20 to 29. In a separate study utilizing only word-cues, Rubin and Schulkind (1997b) found that the bump occurred for older (aged 73), but not younger (aged 20) participants. In an examination of recollective accuracy, a different class of evidence was obtained regarding the nature of bump-period memories. Belli, Schuman, and Jackson (1997) found that when occurring in the transition period (i.e., 10 to 30 years of age), memory for public events (e.g., the Tet Offensive, Woodstock, Watergate) and figures (e.g., Joe McCarthy, Rosa Parks, and John Dean), while still susceptible to error, is better than that from other life phases. Like Jansari and Parkin, Belli, et al. supported the first experience

hypothesis as a potential cognitive account of superior memory accuracy for transition period events. Taken together, these studies demonstrate that the reminiscence effect is a robust effect that can be elicited with a variety of cues and that bump period (aka transitional phase) events are not only recalled more, but are recalled also more accurately. Despite the growing abundance of evidence regarding the special properties of the bump period, there was still no broad consensus on the cause of the bump.

2. TOWARDS CURRENT PROMINENT ACCOUNTS OF REMINISCENCE

By the late 1990's, several accounts of the bump had been expounded. Rubin, Rahhal, and Poon (1998) presented one of the most comprehensive reviews of these accounts up to that time, describing four mutually compatible accounts of the reminiscence effect. These were the cognitive, biological, identity formation, and genetic fitness accounts. Due to its status as the account with the most tenuous support and lack of influence on later reminiscence bump theorizing, discussion of the genetic fitness account, which mostly pertains to several possible effects derived from the importance of the bump period in procreation, will be omitted. Below I review each of the remaining three accounts separately, while considering not only that presented by Rubin et al. (1998), but also theorizing on these accounts subsequently developed by others.

The cognitive account draws upon mechanisms well established as affecting memory and greatly emphasizes the effects associated with the encoding of novel, distinctive events, many of which occur in the bump period, and the transition from a lifetime period of rapid change corresponding with the bump period, to one of relative stability corresponding to the time after the bump period. There are several aspects of a novel experience that engage cognitive processes that augment memory. Novel events

are subject to more elaborate cognitive processing, i.e., greater depth-of-processing. This is because such experiences may require extra effort to analyze or comprehend them, something not necessary with already experienced situations. Deeper processing, according to Craik and Lockhart (1972), leads to superior encoding and retrieval than less effortful, or "shallow," processing, and may lead to more easily accessible cues. Additionally, novel experiences would benefit from minimal proactive interference (PI), the interference of previously learned information, which is minimal to non-existent for novel experiences. Additionally, the "release" of PI augments memory for novel experiences following similar, successive occurrences. Another quality of novel experiences relevant to memory is distinctiveness. Highly distinctive events elicit significant levels of encoding that are not present when experiencing previously encountered situations. For one reason, they may be affected by a *script* (Schank & Abelson, 1977), a generic cognitive representation of a common event sequence. Individuals develop scripts from the aggregation of multiple experiences with an event sequence. An effect of script knowledge is that—in contrast with the substantial encoding that occurs in novel situations previously mentioned—commonly experienced events (that are therefore highly scripted) elicit less encoding. Consequently, there is little memory discrimination for actions that are very typical (Graesser, Gordon, & Sawyer, 1979; Graesser, Woll, Kowalski, & Smith, 1980; Smith & Graesser, 1981), making individual examples of a commonly occurring activity virtually indistinct from one another. In this manner, one may be highly likely to recall one's first dinner date with his or her spouse, but without the occurrence of a significantly atypical event during

later instances of dining out, many of those situations will be unremarkable, and therefore, not likely remembered as distinct examples of times one went out to dinner.

The cognitive account attributes some of the enhanced memorability of events occurring in adolescence and young adulthood, a period Rubin et al. refer to as a period of relative instability because of the preponderance of novel and distinctive events, to the fact that it is followed by a period of relative stability. The period of stability, the beginning of which corresponds with the end of the bump period, is marked by a general lack of novel and distinctive events and imparts several memory enhancing effects. These include opportunities for spaced rehearsal, a cognitive factor known to strengthen memory retention, and bolstering the stability of retrieval cues. When a period of stability persists until retrieval, recalled events may still be novel, but are more likely to be retrieved again. Ultimately, they benefit from the memory-enhancing effects of both periods, the stable and unstable. These events will be better encoded and integrated into stable cognitive structures, as well as retrieved more often. Further memory-enhancing effects derived from the beginning of stable periods include the fact that many initial experiences with situations regularly encountered throughout adult life occur during this period, thus serving as the earliest examples of routine behaviors that affect how they are performed later. Looking back to primary behavioral templates serves to reinforce long-term retention through periodic, spaced retrieval. The stable period also helps to ensure that utilized cues will persist and will therefore more likely be available at retrieval. Overall, the cognitive account outlines several effects likely occurring contemporaneously in the critical lifetime period of adolescence to young adulthood. Consequently, these effects make events from this period, especially those that are highly

novel and distinctive, remembered better, thus producing the reminiscence bump. However, as pointed out by Berntsen and Rubin (2002), this account, which was initially described in 1998, does not predict differences in the recall of memories as a function of emotional valence that they observed in their 2002 study.

Though somewhat less well grounded in clearly identified phenomena, the biological account is not without its merits. This account, which was presented under this name by Berntsen and Rubin (2002), was presented in an earlier iteration by Rubin et al. (1998). This account addresses the biologically based developmental trajectory of cognitive abilities. The basic premise is that the functioning of relevant cognitive abilities increases until early adulthood, where they reach their inflection point, whereupon they begin gradually to decline (Craik & Bialystok, 2006). These include processing speed (Salthouse, 1996; Salthouse, 2003), which has been shown to increase from infancy to young adulthood then decline from approximately the twenties into old age, as well as memory and intelligence (Rubin et al., 1998).

Comparatively speaking, the identity formation account has better withstood, and been more influential upon, recent developments in theorizing on the reminiscence bump than either the cognitive or the biological accounts. The influence of identity formation effects, touched upon by Fitzgerald (1988) and Fromholt and Larsen (1991), and covered by Rubin et al. (1998), has ultimately been greater than that of all other competing early accounts, and its successors have come to dominate current theorizing on the reminiscence bump. The bump period is the time in one's life when their identity is formed. Beginning in adolescence, individuals start to develop a sense of who they are. In most circumstances, this is a process that lasts until early adulthood, at which time

one's sense of self is developed and from then on remains relatively stable. If one's identity is reflected in a narrative, that is to say the events that one experienced serve an explanatory function and provide causal coherence as to who one has become, then since much of that identity is formed in adolescence and young adulthood, there will be more events from that period in the narrative than from other lifetime periods. Identity-developing processes were also pinpointed as the source of reminiscence effects by Conway and Haque (1999). According to Conway and Haque, experiences occurring during the processes of identity formation and the development of a stable sense of self are subject to privileged encoding. These events might constitute "self-defining" memories, serving to explain who one is in a similar manner as described in Rubin et al.'s (1998) identity formation account. A modified narrative identity account was later presented by Berntsen and Rubin (2002), based on findings in which a dissociation was observed in the distributions of recalled memories as a function of emotional valence (positive versus negative). When participants were asked to recall their happiest, saddest, most traumatic, most important, and a recent involuntary memory, the reminiscence effect occurred only for the happiest and most important memories. Based on this observation, they considered the potential contributions of *dissociation* and *repression*, as described in psychoanalytic theory, which block memories from consciousness. In addition, they also considered the possible effect of nostalgia. Nostalgia is characterized by positive feelings about the past coinciding with negative feelings about the present and future. While Berntsen and Rubin presented an exhaustive review of the strongest accounts of the reminiscence effect to date in their article, it was the findings from that

paper, and two subsequent collaborations that led to the development of what is currently considered among the best supported accounts of reminiscence.

3. THE RECALL OF HIGHLY EMOTIONAL MEMORIES

An important development in the evolution of autobiographical memory and reminiscence effect research came with the increased use of affective cues in eliciting personal memories, especially after findings by Fromholt and Larsen (1991) demonstrated an extremely pronounced reminiscence bump for individuals' important memories. One example of this approach is the study reported by Berntsen and Rubin in 2002. In a national survey, Berntsen and Rubin asked 1241 Danish participants between the ages of 20 and 93 to report their memories of when they were happiest and saddest, and when they had highly important and traumatic experiences. The findings demonstrated that reminiscence effects clearly occurred in the lifespan distributions of recalled happiest and most important memories, which, ostensibly were biased towards being emotionally positive, rather than negative. However, there were no bumps in the lifespan distributions of saddest and most traumatic memories. In order to confirm this dissociation between distributions of memories of opposing emotional valences, Rubin and Berntsen (2003) conducted a follow up study with a national sample of 1307 Danish adults between the ages of 20 and 94, soliciting requests for memories for other types of highly positive and negative emotional events. This time, participants were asked to report emotionally positive memories such as when they were most proud, most in love, and their most important, positive memory, and emotionally negative memories such as when they were most jealous, most angry, most afraid, and their most important, negative memory. Once again, the reminiscence effect occurred for highly positive, but not highly

negative, emotional memories, with the sole exception of jealously, for which there was a slight bump in adolescence and young adulthood, a finding Rubin and Berntsen attributed to the confounding of times when one is jealous and times when one is in love. Based on these findings, Rubin and Berntsen developed an account of the reminiscence effect that was able to explain the dissociation between the recall distributions of highly positive and negative emotional memories, which they called the *cultural life script account*.

4. THE CULTURAL LIFE SCRIPT ACCOUNT

The cultural life script account is highly effective and parsimonious in explaining the observed dissociation between the lifespan distributions of highly positive and highly negative emotional memories, and in turn, the reminiscence effect. The account utilizes the concept of scripts (Schank & Abelson, 1977), which are generic cognitive structures that delineate the timing and order of events that make up an event sequence, and applies it to the processing of the memories of one's personal past. However, they not only guide retrieval. Scripts provide readily available search descriptions for both encoding and retrieval, thereby exerting an effect at the time at which an event occurs and in remembering it. A cultural life script, by extension, is a temporally and ordinally prescriptive, generic cognitive structure (i.e., a form of semantic memory), delineating the occurrences of important life events in a culture. They can be described in terms of slots and their requirements concerning culturally normative important life events. They are nonpersonal and represent shared public knowledge, not one's own experiences. Moreover, they do not represent an average life. Instead, they represent an idealized life and are distorted from actual lives to favor positive life events, which in turn may make one's own deviations from their culture's script an especially salient feature of how

people perceive themselves as individuals. They are derived from experience and apply normatively to all members of a culture. Life scripts produce a bump in autobiographical memory recall because: 1) most positive transitional life events in life scripts occur during adolescence/young adulthood (getting a first job, falling in love, getting married, entering parenthood), and 2) they provide readily available search descriptions. Life scripts guide memory retrieval towards when one is most likely to have experienced highly positive events, but not heavily negative ones. In autobiographical memory recall structured by cultural life scripts, memories for negative events should be either distributed randomly across the lifespan or conform to a monotonically decreasing retention function, as life scripts do not prescribe the timing or order of their occurrence. The cultural life script account has obtained robust support through a number of studies and several types of evidence have accumulated in its support via several different testing paradigms.

Initially, empirical evidence in support of cultural-life scripts came in the form of robust findings of the dissociation of distributions of highly positive and negative emotional memories (Berntsen & Rubin, 2002; Rubin & Berntsen, 2003) Additional evidence in support of the cultural life script account was presented by Collins, Pillemer, Ivcevic, and Gooze (2007). In their study, participants were asked to remember when they felt "especially good" or "especially bad" about themselves. In addition, they reported an incident that precipitated feeling especially good or bad about themselves. The findings showed that for both younger (college students) and older (university alumni from the classes of 1978 and 1979, *M*age = 46.8 and 45.8, respectively) participants, there was a peak at ages 17 and 18 in the distribution of positive memories

in the period of 8 to 18. Negative memories were distributed relatively evenly throughout the same period. Additional analyses revealed that a substantial proportion of the positive memories that were reported reflected culturally prescribed transitional events, such as the transition from high school to college, i.e., graduating high school or the first day of college. Furthermore, when participants reported memories from the lifetime period of 10 to 15 years of age, a period within the commonly observed reminiscence bump, but one not including many transitional events, the distributions of positive emotional memories were flat as well, as would be predicted by the cultural life script account of the reminiscence bump.

A separate class of evidence supporting a life script account of the reminiscence bump has been produced through script generation studies. Two such studies conducted with Danish participants were those by Berntsen and Rubin (2003) and Rubin and Berntsen (2004). In the former, 87 undergraduate students reported the ages at which they estimated a hypothetical 70-year person would have experienced the memories of when they were most afraid, most proud, most jealous, most in love, and most angry. The resulting distribution placed most positive memories in the reminiscence bump period and negative memories were distributed randomly across the lifespan. Additionally, the timings of positive memories were given higher confidence than of negative ones, thus indicating the presence of a culturally shared life script for positive and not negative emotional memories. These findings were replicated with a sample of 1,485 Danes who estimated the ages of the times at which a hypothetical centenarian would have been their happiest, saddest, most afraid, most in love, and when they would have experienced their most important and most traumatic memories (Berntsen & Rubin, 2004). Once again, it

was found that there was only a bump for positive events, and that it occurred between 15 and 30 years of age. In a slightly different procedure, Danish undergraduate students generated lists of the seven most important events likely to occur in the prospective life of a hypothetical newborn. More events that are positive were predicted and they were more likely to occur between the ages of 15 to 30. Script generation was also employed by Erdoğan, Baran, Avlar, Taş, and Teckan (2008) to determine if there was evidence of a shared cultural life script among a sample of Turkish participants. Similar to the procedure utilized by Berntsen and Rubin (2004), Erdoğan et al.'s participants generated lists of the seven most important events likely to occur in the prospective life of a hypothetical newborn and elderly person. Their findings, which were remarkably similar to those produced by Danish participants, showing once again that there were more positive, than negative, events, and that the timing of positive events were reported with higher confidence ratings. However, they did observe some differences between the scripts of the hypothetical newborn and elderly person. For instance, the occurrence of war as a life event was prevalent in the life scripts for hypothetical elderly, but not newborn, individuals. Erdoğan et al. also determined that based on their findings, the makeup of the cultural life script was relatively stable across genders. Another replication of this procedure, but with the addition of measures of depression, posttraumatic stress disorder (PTSD), and centrality of negative events, was conducted by Rubin, Berntsen, and Hutson (2009) with both Danish and American samples. Their findings indicated that there was significant overlap between the life scripts produced by the American and previous Danish samples and that once again, more positive, than negative, events were generated, with most in the bump range, and their timings were

estimated with higher confidence than those for negative events. Some differences were evident, but further examination reveals that these differences likely reflect actual cultural differences, such as differences in the timing of landmark events in educational attainment that reflect differences in the structure of educational systems between the two countries. Despite these relatively minor differences, the authors concluded that overall, the findings support the notion that there is a similar underlying cognitive structure in the form of a cultural life script present in the American, current, and previous Danish, samples, and the Turkish sample reported on by Erdoğan et al. (2008). Soon researchers endeavored to uncover other potential sources of variability in cultural life scripts.

To determine whether life scripts are stable across age groups, Bohn (2009) conducted a study comparing the life scripts produced by younger and older participants. Participants generated lists of the seven most important expected life events and the age at which they would occur for a hypothetical person. The findings indicated that for both groups there was a bump for positive events between the periods of adolescence and young adulthood, thereby demonstrating that cultural-life script structure is relatively stable across generations. However, some variation was evident. On the one hand, older adults produced a less idealized life script, which tended to contain more events that are negative. On the other hand, the younger group's life scripts tended to reflect a more idealized life. Importantly, with regard to the events included, their timings and order, the differences in the makeup of the cultural life scripts produced were minimal, and not substantial enough to lead the authors to conclude that cultural life scripts vary as a function of age. Overall, the scripts of the two cohort groups shared more similarities than differences and the authors concluded that there were no cross-generational

differences in cultural life scripts. Another study looking at age-related differences in cultural life scripts (or the lack thereof) was that by Janssen and Rubin (2010). In their study, participants from three age groups completed the script generation procedure used by Berntsen and Rubin (2004) with the goal of determining if life scripts were indeed a form of semantic memory, a claim of cultural-life script theory that, up to that point had been assumed, but not tested directly. As a form of semantic memory, life scripts are nonpersonal, and simply entail prescribed timings, rather than reflecting the occurrence of events in one's own life. An actual life may deviate from the cultural life script, which potentially can have the effect of making events that are script violations even more salient to one's identity, self-narrative, or life story. Participants were divided into three groups, those between ages 16 and 35, between 36 and 55, and between 56 and 75. As predicted, the majority of chosen events were positive and mostly occurred in childhood and early adulthood, with more than half (55.4%) occurring in the period of adolescence to early adulthood. Furthermore, extremely few positive events were estimated to occur outside of the bump range, and the events estimated to occur before the age of 36 were, on average, positive, while the events expected to occur after age 35 were, on average, negative. Additionally, negative events were more evenly distributed across the life span. With regard to the age group comparison, the findings demonstrated that there was very high agreement on cultural-life script events between the three age groups, with no difference in expected age of occurrence, prevalence, importance, and valence of events between groups. Also supporting the claim that life scripts are a form of semantic memory, Janssen and Rubin also found that there was little difference in the makeup (*i.e.*, the events included, their timing, and order) of cultural life scripts between levels of

educational attainment when the participants were divided into 4 groups, based on the amount of schooling received. Because of the lack of variability in the content and structure of cultural life scripts in terms of their events, timing, and order of occurrence across age groups and educational levels, Janssen and Rubin concluded that this prevalent cognitive structure is indeed a form of semantic memory. As such, it is unaffected by personal experiences, from which differences would probably arise between generations and varying levels of educational attainment.

Overall, the cultural-life script account, originally proposed by Berntsen and Rubin (2002), has accumulated ample evidence in its support from several classes of evidence and across replications. The dissociation between the distributions of positive and negative emotional memories in both autobiographical-memory-recall and script-generation studies have both been replicated several times. However, only the script generation task has been replicated across several distinct cultures, such as Danish (Rubin & Berntsen, 2003; Berntsen & Rubin, 2004; Bohn, 2009), Turkish (Erdoğan et al., 2008), Dutch (Janssen & Rubin, 2010) and American (Rubin et al., 2009) samples. Autobiographical-memory recall studies with elderly subjects have only been conducted with a Danish sample (Berntsen & Rubin, 2002), while the only autobiographical recall study with an American sample consisted of college students and adults under 50 (Collins et al., 2007). This disproportionate amount of script generation, as opposed to autobiographical recall research ostensibly is simply a reflection of the practical challenges of conducting large-scale, survey data collection procedures, which are typically required for autobiographical recall studies. While autobiographical memory studies require older adult samples, which are less easily accessed, script generation

studies can be carried out with relatively small sample sizes and conveniently accessible undergraduate samples, as life scripts can be tested with young adults. The lack of an autobiographical recall study with diverse populations is currently a limitation of the cultural life scripts literature. Moreover, the extant research in script generation is also limited in the same regard. While several cultures have been investigated, they have been relatively homogenous. To this point, no cultural life script research has been conducted with samples varying in substantive ways, such as minority status. Historically, minority populations, especially those in the United States, have faced substantial adversity. If populations that experience more emotionally negative life events produce more negative life scripts, such a finding would call into question the premise that they are culturally transmitted semantic knowledge. Instead, such a finding would indicate that participants are basing the life script on their own lives.

While the cultural life script account has demonstrated its ability to explain effectively and parsimoniously the dissociation between the distributions of recalled positive and negative emotional memories, it is not alone in being able to do so. Another prominent account exists, which has been supported through empirical findings from autobiographical recall studies.

5. THE LIFE STORY ACCOUNT

Another account of the reminiscence bump and the dissociation between the distributions of positive and negative emotional memories is the life-story account (Glück & Bluck, 2007). The life-story account has its basis in life span developmental theory (Baltes, Reese, & Lipsitt, 1980; Baltes, Staudinger, & Lindenberger, 1999). The primary concern of life span development theory is developmental processes across the entire

human life course. Based on this, Bluck and Habbermas (2000) presented a theoretical treatment about what they at the time referred to as the life-story approach, and later as the life span perspective (Bluck & Habbermas, 2001). The life story account is complementary to the life script account and extends it by sharing key predictions, such as the structuring of highly positive, but not highly negative emotional memories, and additionally identifying further the qualities of memories that are included in the bump. Many of these qualities or characteristics revolve around their importance in conveying one's autobiography and are based upon cultural, emotional, and motivational influences that govern the organization of one's life story.

By incorporating a more holistic, rather than purely cognitive approach to memory, Bluck and Habbermas (2000) sought to move even further ahead Neisser's (1978) call to increase the ecological validity of autobiographical memory research. The product of this effort was the life story schema. The life story schema is a mental organization used to produce life narratives. This schema is activated when one engages in autobiographical reasoning. The types of coherence delineated by Bluck and Habbermas are temporal, thematic, and causal coherence, and the cultural concept of biography. Temporal coherence and the cultural concept of biography provide both a temporal script for the ordering of life events, as well as and an indication of what events should be selected or included in the life story. The cultural concept of biography refers to the internalized norms instilled in the individual about what is appropriate content for inclusion in the life story, and provides direction towards meaningful and important, culturally-sanctioned life events. Additionally, it conveys information about the normative timing of life events, such that one may judge if the timing of her or his

experience is on target or off target relative to the norms of her or his culture. Thematic and causal coherence are, as previously stated, forms of "meaning-making (Bluck & Habbermas, 2000, p. 124)" that provide explanations and themes for understanding the life story. Causal coherence, Bluck and Habbermas suggest, may actually be the most significant form of coherence in the life story. As will be seen later, many of the variables that are included in life story research involve judgments about causality as predictors of their inclusion in the reminiscence bump. Overall, the life story, according to Bluck and Habbermas, provides a more integrated representation of the events that make up our lives, as opposed to a mere collection of isolated memories for (important) events. The four forms of coherence coalesce to provide summaries of life periods and their connections, and may also be important in motivating future actions and perceptions.

Based on life story theorizing outlined by Bluck and Habbermas (2000; Bluck & Habbermas, 2001), Glück and Bluck (2007) proposed the life story account of the reminiscence bump and the dissociation between the distributions of highly positive and negative memories. Like the cultural life script account, the life story account predicts that highly positive, but not highly negative, life events will form a reminiscence bump. However, the life story account makes further predictions about which events will be included in the bump. Bump events are not only emotionally positive, but they are also more likely to be developmentally influential and consequential to later life outcomes and reflect instances of exerting control over one's life. Moreover, they enable causal coherence supporting one's life story and serve an explanatory function toward understanding one's life trajectory. Positive memories that do not meet the above criteria

do not rise to the threshold to be included in the reminiscence bump. Instead, the life story account predicts that these positive memories will produce a relatively flat distribution, much as negative life events do. In their study testing the life story account, Glück and Bluck examined 3,541 memories reported by 659 participants between 50 to 90 years of age. Each participant reported her or his 15 most important memories and then estimated time of occurrence and ratings of each memory on several qualities predictive of inclusion in the bump. These included ratings of: (1) Emotional valence; (2) valence of later consequences; (3) perceived control; and (4) how influential on one's personal development. Their findings indicated that while the distribution of positive events demonstrated a reminiscence bump, all negative events were relatively flat. However, when positive memories were separated into those that were rated high on perceived control and low perceived control, only the high-perceived control memories produced a reminiscence bump. Moreover, these memories were rated as significantly more influential on who one became in life than positive, low-perceived control events and negative events. Finally, only those life events that were emotionally positive and high-perceived control formed a bump. Emotionally positive, low-perceived control, and emotionally negative high- and low-perceived control events did not form reminiscence bumps. These results were explained by Glück and Bluck as being because there are few opportunities to exercise perceived control during childhood, but the number of such opportunities increases in adolescence, then stabilizes in adulthood. They contend that adolescence is not simply a time of positive events, but one composed of positive instances of exerting control. Overall, Glück and Bluck's findings supported the life story account. In doing so, they also support the cultural-life script accounts, as the two

accounts are compatible. Many of the observed effects from the life story account can be explained by the cultural life script account. This is mainly because of the fact that the events that comprise the cultural life script inherently share the qualities of life story events, despite the fact that the cultural life script account does not make specific predictions about the same variables used to test the life story account. Since Glück and Bluck's study, further support for the life story account has been obtained.

Demiray, Gülgöz, and Bluck (2009) conducted a study replicating that of Glück and Bluck with the intention of (a) testing the life story account, and (b) replicating the reminiscence bump with a Turkish sample. Up to this point, studies of autobiographical recall replicating the dissociation between the distributions of positive and negative emotional memories have been conducted mostly in Anglo-Saxon countries and too limited a range of other cultures to state definitively whether the bump can be replicated in all non-Western cultures. Like Glück and Bluck, Demiray et al. had participants report autobiographical memories and the age at which they occurred, as well as ratings of various factors predictive of whether an event would be included in the reminiscence bump. However, they used an alternative set of variables. Participants rated events on novelty and importance to identity development. In addition, participants provided answers to two questions pertaining to distinctiveness, whether they had ever experienced an event similar to that one before (*i.e.*, it was a first-time experience) and whether they experienced events similar to that one later in life (*i.e.*, it was not a one-time experience). Events were also coded by the researchers as to whether they were transitional events, as most bump events have been described to be in script generation studies. Their coding was based upon a combination of events most commonly reported by Danish (Bertnsen &

Rubin, 2004) and Turkish (Erdoğan et al., 2008) samples. Finally, events were rated on importance, as in "How important was this event for you back then?" and vividness, as in "How vivid is this memory in your mind right now?" on 5-point Likert scales. Their findings demonstrated that: (1) The reminiscence bump was replicated with a Turkish sample; (2) there was a bump for distinctive, one-time events; (3) there was a bump for transitional events; and (4) bump memories were rated more important for identity development. Overall, Demiray et al.'s findings supported the main goals of their study. They obtained empirical evidence in support of the life story account as well as for the generalizability of the reminiscence effect across cultures. The findings demonstrated for the first time with a non-western culture that the occurrence of the reminiscence effect for emotionally positive, but not emotionally negative, events is generalizable across cultures.

While sharing many similarities, the tests of the life story account by Glück and Bluck and Demiray et al. deviate from one another in key methodological aspects. Specifically, Glück and Bluck used as their autobiographical cue a request for the 15 most important memories from one's life, whereas Demiray et al. made no prescriptions regarding importance, but instead made it a measured variable, by having participants report any life events that they chose, then rating their importance. Consequently, Demiray et al. observed that bump events were rated significantly more important that non-bump events. Also notable is the discrepancy in sample size between the two studies. Using 659 participants, Glück and Bluck collected reports of 3,541 memories (M = 5.37). Demiray et al. were able to collect 6,373 memories from just 72 participants (M = 88.5), meaning that Demiray et al. were able to collect 1.8 times as many memories as

Glück and Bluck with a sample only 11% of the size. This is clearly due to the procedural differences between the two studies. Glück and Bluck requested participants to report their 15 most important memories, while Demiray et al. gave participants 7 minutes to write down as many memories as possible for every 5-year period in their lives.

6. CROSS-CULTURAL REMINISCENCE EFFECT RESEARCH

The extant literature on the reminiscence effect includes research conducted in several different countries. However, as Demiray et al. indicated, most were from countries that were either European or of European descent, such as Denmark (Berntsen & Rubin, 2002; Rubin & Berntsen, 2003; Bertnsen & Rubin, 2004; Rubin et al., 2010), the Netherlands (Janssen & Rubin, 2010), Austria (Glück & Bluck, 2007), England (Conway, Wang, Hanyu, & Haque,2005) and the United States (Conway et al., 2005; Collins et al., 2007; Rubin et al., 2010). One study by Schrauf and Rubin (1998) utilized a sample of participants from various Spanish speaking countries including, Argentina, Cuba, Guatemala, Panama, and Spain. Research in non-western cultures includes investigations conducted in Turkey (Erdoğan et al., 2008; Demiray et al., 2009), Bangladesh (Conway & Haque, 1999; Conway et al., 2005), Japan (Conway et al., 2005; Kawasaki, Janssen, & Inoue, 2011), and China (Conway et al., 2005). Among all of the above-mentioned countries, Denmark, Turkey and the United States have the distinction of being the only ones from which multiple classes of evidence for the existence of cultural life scripts have been obtained. Studies have been conducted in these countries testing both the reminiscence effect in autobiographical recall and the life script. However, in the case of the United States, evidence of the bump in retrospective reports

has not been tested in a manner directly comparable to the studies of Berntsen and Rubin (2002), Glück and Bluck, and Demiray et al., in that the one study conducted did not include the elderly (Collins et al., 2007). Singularly unique to the study by Demiray et al. is that while it did replicate the reminiscence bump with a non-western culture, as had previously been shown with Japanese, Bangladeshi, and Chinese samples by Conway et al. (2005), it is the only study which has observed the dissociation between the distributions of highly positive and negative events in a non-western culture. Conway et al. did not compare memories as a function of emotional valence. With regard to the life story account, it has only been tested in Austria (Glück & Bluck, 2007) and Turkey (Demiray et al., 2009). Among these studies utilizing various procedures carried out within a variety of countries and (a more limited) variety of cultures, some differences have been observed between their findings.

Differences in the manifestation of the reminiscence effect between cultures have been observed both within cultures (i.e., within macro culture designations such as Western culture, but between countries which comprise it), and between cultures (i.e., Eastern versus Western). These differences range in significance from the relatively minor to major. For instance, Conway and Haque (1999) found that, while both younger and older Bangladeshi participants produced lifespan distributions of autobiographical memories with bumps in adolescence and young adulthood, the older group produced another bump in the distribution, *i.e.*, it was bimodal. This other bump reflected the period during which Bangladesh fought a struggle for independence against Pakistan. In their study, Schrauf and Rubin (1998) observed a bump for the period when individuals originating from Spanish speaking countries immigrated to the U.S. Similarly, Conway et

al. (2005) observed differences in reported memories between their U.S. and Chinese participants. While all of the groups in their study produced similar reminiscence effects, leading Conway et al. to conclude that there are no cross-cultural differences in the distributions of autobiographical memories across the lifespan, content analyses revealed differences in the types of memories recalled between the groups. For example, Chinese participants had an interdependent focus, reflecting the collectivist focus of their culture, whereas the memories of U.S. participants had a more independent self-focus, reflecting the individualist focus of Western and U.S. culture. Conway et al. concluded that overall, their findings indicate that the reminiscence bump in the period of adolescence and young adulthood is produced by processes that operate independent of culture that mediate the emergence of these periods in the life-span retrieval curve. Culture influences memory content in a way that produces cross-cultural variation in what is remembered, but not from what lifetime period is involved. While this one example is from a study of retrospective reports, differences have been observed in script generation studies as well.

Script generation studies conducted in various countries and cultures, including Northern European countries such as Denmark and the Netherlands (Bertnsen & Rubin, 2004; Rubin et al, 2009; Janssen et al., 2010), the U.S. (Rubin et al., 2009), and Turkey (Erdoğan et al., 2008), have produced discrepancies that seem to indicate some true differences in expectations of the events in the normative life between them. The convergent findings include those that more positive than negative events are produced, that there are more positive events than negative ones in the bump period (10 to 30), and agreement on the timing of positive events is higher than agreement for the timing of negative events. Because of these findings, leading proponents of the cultural life script

account such as Rubin and Berntsen conclude that the main characteristics of cultural life scripts are invariant across cultures (See Rubin et al., 2009 for a review of the characteristics of cultural life scripts). Discrepant findings among existing tests of the life script mainly fall into two categories: (1) greater numbers of negative events in the life script; and (2) the presence of some unique events. One example of the latter is circumcision in the study by Erdoğan et al. While circumcision at approximately 5 years of age is listed as an important life event by the Turkish sample, this event is not listed among important life events at any age in the American and European samples. Additionally, military service is listed among important life events by the Turkish and not by Americans or Europeans, due to compulsory military service in that country for all male citizens. Therefore, the presence of military service in the Turkish life script reflects a genuine cultural difference. Another event nominated for inclusion in the life script by Turkish participants that was not included in the scripts generated by the Western samples was "traffic accident," a negative event. In addition, while "accident" was listed as a common life event for both the Dutch and Turkish samples, it did not make the list of life events in the American sample. There also have been differences observed as a result of an experimental manipulation. In the study by Erdoğan et al., Turkish college undergraduates were placed in two conditions. In one, participants nominated events likely to happen in the prospective life of a hypothetical newborn. In the other, participants nominated events likely to have happened in the life of a hypothetical elderly person. War was listed as a common life event by the Turkish sample for the elderly person, but not for the newborn, the implication being that when cued to generate events for an elderly person, answers more closely reflected actual

historical information, whereas events nominated for the newborn reflected a more idealized life. However, these differences have been considered relatively minor. Overall, none of the studies ever had more than a couple unique events and the number of extra negative events in any given study was never substantial. However, it may be the case that the differences between the heretofore-examined cultures have not been substantial enough. One similarity that all previously examined cultures share is majority status. Ostensibly, a majority culture would have less experience with negative life events than would a minority culture, especially when it has been subjected to oppressive and discriminatory treatment. Potentially, some of these heretofore observed small differences in the number of unique events and the proportion of negative events in the life script may be more pronounced when examining the cultural life script of an historically unfairly treated minority.

How, and due to what influences, can the reminiscence effect and the dissociation between the distributions of emotionally positive and negative memories be different for minorities compared to those majority cultures already investigated? In considering factors that may contribute to differences in the recall of negative emotional events, one must take into account the real lifetime prevalence of negative emotional events. Ostensibly, greater amounts of emotionally negative events occur for racial/ethnic groups that experience disproportionately high levels of low socioeconomic status (SES), i.e., poverty, and incarceration, low levels of educational attainment, and greater levels of discrimination. Discrimination, for instance, has been found to have numerous, profound, long-lasting effects psychological effects on individuals. In a study by Kessler, Mickelson, and Williams (1999), it was shown that the most common reason

for perceived discrimination is in fact race, at 37.1%, and that lifetime prevalence rates of perceived discrimination are substantially higher for African Americans (48.9%) than for Whites (30.9%). In their study, Kessler et al. found that, compared to Whites, African Americans experienced higher rates of discrimination in all domains examined except being forced to leave a neighborhood. These include: Not being hired for a job (24.4% vs. 14.8%); not being given a promotion (27.8% vs. 10.6%); denial of service or reception of poor service (15.2% vs. 8.0%); discouragement in education (14.0% vs. 6.9%); denial of bank loans (19.8% vs. 4.9%); harassment by police (19.3% vs. 4.2%); being fired from a job (10.5% vs. 5.0%); being prevented from renting or buying a home (15.7% vs. 2.0%); and denied or received inferior medical care (6.8% vs. 2.5%). Clearly, there are a substantial number of experiences of perceived discrimination among African Americans, and therefore an indication that the actual occurrence of negative life events among African Americans may be higher relative to the dominant White culture. With regard to poverty, evidence overwhelmingly indicates that African Americans, both currently and historically, experience poverty at rates much higher than White Americans. The U.S. Census Bureau indicates that between 2004 and 2006, African Americans adults aged 18 to 64 experienced higher rates of chronic poverty (8.4%) than Whites (1.4%) and Hispanics (4.5%). Numerous hardships are associated with living in poverty which may form the basis for memories of negative emotional events, such as deprivation, lack of safety, increased health risk from lack of adequate healthcare, emotional stress within the family, among possible others. There are several implications for memory based on these facts. Utilizing cultural life script and life story theory,

several conclusions may be drawn about how they might lead to reminiscence effects for memories of discrimination.

There are several ways that the high prevalence of actually experienced perceived prejudice may affect memory. First, let us consider how this may occur within a cultural-life script account of autobiographical memory recall. Cultural-life scripts are a type of script, as described by Schank and Abelson (1977), regarding the timing and order of life events, and are culturally transmitted to the individual. Ultimately, they reflect societal norms, the standard patterns of behavior considered normal in a society. That said, one might ask if exposure to unfair treatment is standard in a culture and what the effect of that exposure is. If it is considered a normative part of life in a culture, unfair treatment might be an expected occurrence in life. However, a script requires that there be an expected timing or order of the occurrence of events. It is unlikely that expectations of unfair treatment are anticipated to occur at precise times. Unfair treatment cannot be predicted with the precision that one may predict high school graduation or the age at which people get married. Unfair treatment may be expected to happen, and may even be considered quite prevalent, but there are no prescribed slots for the timing of its occurrence in a script. This type of expectation may constitute a theme in life. In conclusion, the cultural-life script account does not lend itself well to the accounting for recalled memories of unfair treatment, in light of the lack of prescribed, specific timings, a property of scripted events. Instead, the life story account may be better suited to explain not only a bump for memories of unfair treatment, but for emotionally negative memories in general.

The primary manner in which the life story account may better explain increased recall of memories of unfair treatment in early lifetime periods is because of the fact that the life story account attributes differential sampling to the importance (i.e., consequences, etc…) of actually experienced events. People tend to sample at a greater rate those memories that explain later life outcomes. The memories facilitate autobiographical and causal coherence in one's life story. In this manner, early life experiences of discrimination that may be pinpointed as the origin of a negative life course trajectory may serve an explanatory function. Because adolescence and young adulthood is the most developmentally influential lifetime period, numerous events occur within it that are recalled as being consequential and influential on whom one has become. If any of the developmental experiences have negative outcomes, i.e., are unfulfilled, they may be looked back upon as highly influential negative events. By combining importance and consequentiality, which the life story account asserts predict an event's inclusion in the bump, with negative emotion, the life story account can be revised with a change to only one of its criteria to predict reminiscence for emotionally negative memories. Additionally, evidence suggests that attributing negative outcomes to external sources such as discrimination by others may actually be adaptive, in that it has an ego-protective effect.

Research has shown that when individuals experience negative outcomes, the possibility of being the victim of discrimination can buffer against harmful effects on self-esteem, because the availability of prejudice as a plausible external cause of negative outcomes allows the victim to discount personal responsibility in the situation (Crocker & Major, 1989; Crocker, Voelkl, Testa, & Major, 1991; Dion, 1975; Dion & Earn, 1975;

Major & Crocker, 1993). In these cases, the judgment or treatment was based on social identity or group membership, and the individual believes that the judgment rendered was unjust or undeserved (Major, Quinton, & McCoy, 2002). Findings by Major, Kaiser, and McCoy (2003) show that females rejected because of sexism made internal attributions of blame significantly less than those rejected based on lack of intelligence. Moreover, rejection based on prejudice resulted in rating sources of rejection significantly less to internal causes. It was shown in another study that discrimination based on overt sexism resulted in less injurious effects on self-esteem than rejection based on reasons other than prejudice (Major, Quinton, & Schmader, 2003). Overall, the empirical evidence presented suggests the adaptive nature of external, as opposed to internal, attributions of negative outcomes. Inasmuch as this is an adaptive function, one may intuitively speculate that it is a reinforcing behavior and that its use would beget its future use. Related to this is also the potential that once an external source has been identified as the cause of negative outcomes, individuals may seek out affirmation of their beliefs from others by sharing their grievances with them, thus contradicting the assertions of both the cultural life script and life story accounts that social censure proscribes the discussion of negative life events.

Another potential source of evidence indicating that memories for experiences of discrimination are held as long-term sources of stress are the numerous findings associating experiences of racial discrimination with adverse health outcomes such as increases in the rates of depression, hypertension, cardiovascular disease, as well as other mental and physical health problems (Williams, Neighbors, & Jackson, 2003; Brondolo, Rieppi, Kelly, & Gerin, 2003). Ostensibly, for these experiences to be influential, they

must be retained in one's autobiographical memory, and potentially, it is their differential recall that is the source of their powerful, pernicious influence. Potentially, replaying these events in one mind and assessing their deleterious effects on one's life, thereby acknowledging their developmental importance and the extent of their consequentiality, may be the source of stress that contributes to these illnesses.

Because of its emphasis on retrospective assessments of importance and consequentiality in guiding retrieval, the life story account is better suited to explain how negative emotional memories such as experiencing discrimination may potentially be differentially sampled. The examples provided explain, using evidence from racial and ethnic minority psychology, an area presumably overlooked by, or not well known to, prominent life story theorists (the majority of whom are European and not likely familiar with the field of ethnic minority psychology in the United States). It may therefore be possible that experiences of discrimination can become life story events, thus resulting in their differential sampling and possibly producing a bump in the lifespan distribution of recalled autobiographical memories.

7. REVIEW ON THE RECALL OF NEGATIVE EMOTIONAL MEMORIES

Current evidence suggests that when individuals are cued to recall highly emotional events from their lives, the reminiscence effect does not occur for negative emotional memories. One exception to this however, were findings regarding the recall of memories of when one was most jealous. When Rubin and Berntsen (2003) asked participants to report memories of the times that they felt the most jealous, there were clear bumps in early adulthood for five of the six age groups (from 20 to 70, broken up by decade). The authors suggest that this result may be due to memory search guided by

expectations when one was in love, and possibly, the times during that period when love may have its most "ups and downs." The lifespan distributions of memories for when one was most in love had clear bumps in adolescence and young adulthood for all six age groups, thus supporting this account of the bump for jealously. The observed bump for memories of when one was most jealous provides a rare example of a reminiscence effect for negative memories guided by cultural life scripts. However, evidence exists indicating that reminiscence bumps may occur for negative emotional memories when other cueing techniques are employed and that they may be caused by some mechanism other than cultural life scripts or life story schemas.

Several studies have shown that the use of a word-cue technique can result in reminiscence effects for negative emotional memories, including that by Conway and Haque (1999) examining Bangladeshi participants and studies by Janssen and Murre (2008) and Janssen, Gralak, and Murre (in Press) using the Galton-Crovitz test. Conway and Haque (1999) found that when Bangladeshi participants provided autobiographical memories in response to word-cues, an unexpected result was observed: Older participants displayed a second bump in their distribution of memories across the lifespan that occurred between the approximate ages of 45 to 55. Furthermore, substantial portions of the memories in this unexpected bump were emotionally negative. Interestingly, the period covered by this bump corresponded to the period during which Bangladesh fought for independence from Pakistan, indicating that the effect was more likely caused by actually occurring events affecting an entire cohort equally, rather than cognitive mechanisms such as scripts or schemas guiding differential sampling. Less easily explained, however, are the bumps for negative emotional memories observed in

the studies by Janssen et al. (in Press) and Janssen and Murre (2008). While the authors observed bumps for negative emotional memories, they actually observed that overall, most events recalled from the bump period were regular, unemotional, neutral, and unimportant. Moreover, there were no substantial differences in the bumps observed between emotional (positive and negative) and emotionally neutral events, or unemotional, moderately emotional, and very emotional events. Because of these results, the authors concluded that none of the examined qualities (novelty, emotionality, emotional valence, and importance) fully explains the reminiscence effect.

The finding that word-cues produce a bump for emotionally negative events but cues to life events do not suggests that activation of a mechanism that guides retrieval of only positive emotional memories, such as a cultural life script, is dependent on the autobiographical cues employed. In all likelihood, cultural life scripts are activated by cues such as those prompting one to recall their happiest or most important memory, while word-cues do not activate such scripts. Therefore, cultural life scripts are not an always-present mechanism structuring all autobiographical recall, but rather, only structure recall when activated. In addition to findings from word-cue studies, other studies have produced findings indicating possible alternative mechanisms through which reminiscence for negative emotional memories can occur.

Evidence from reminiscence bump research has shown that one possible source of reminiscence for negative emotional memories is *history-graded events*. History-graded events are those that occur at the same historical time, but in different age periods for different cohorts of individuals. In other words, actually occurring, large-scale negative events affecting countries or regions, such as war, may produce bumps for

negative events that are shared at the same time for people of different ages. One example is that presented by Rubin and Berntsen (2003) in which Danish respondents reported their memories of when they were most afraid or of their most traumatic memories. This observed bump was clear evidence of a cohort effect for World War II and the time that Denmark was occupied by Germany. Similar findings were obtained by Glück and Bluck (2007), where they found that Austrian participants had reminiscence bumps coinciding with World War II regardless of their age during that period. One can reasonably expect that history-graded effects may be evident in the autobiographical recall of U.S. minority populations. However, if this turns out to be the case, they may not be the only potential source of structuring effects for the recall of negative emotional memories.

There are several potential sources of cohort effects in the autobiographical recall of U.S. minorities. The primary cause of discrimination is race. That being said, in the current societal context of much of the United States, one's race is immutable, thereby making the potential for discrimination based on race a lifelong possibility. Therefore, if one were to recall memories of exposure to racial discrimination, one may potentially sample from any time in one's life, and this would be the same across the entire population. The Civil Rights Act of 1964 may be a possible history-graded event affecting the prevalence of experiences of unfair treatment for African Americans. The bill, which made illegal government sanctioned discrimination, may have led to a decrease in acts of overt racism and possibly, changes in the type of racism younger generations experience compared to older generations. It may indeed be the case that there can be higher rates of reported memories of unfair treatment that correspond to

times in the United States when overt racism was more prevalent. However, as a result of the persistent nature of racism (perhaps now existing at high rates, but in more subtle forms) it is likely that younger cohorts will still report high rates of discriminations based on race, but that they are more likely to report incidents of "aversive racism (Gaertner & Dovidio, 2004)." The term aversive racism refers to negative attitudes toward minorities by Whites, resulting in covert and non-confrontational forms of racial discrimination such as rejection in hiring, promotion, access to loans, etc. Such incidents may occur despite, or be concealed by, Whites explicitly endorsing egalitarian views.

THE CURRENT STUDIES

As evidenced by the literature review, research on the cultural life scripts and life story accounts of the reminiscence effect is relatively limited, having only begun within the last decade, starting with Berntsen and Rubin's (2002) work. Accordingly, there is still ample room to provide additional evidence in support of these accounts and further test the generality of their theoretical claims, especially through the completion of studies examining their effects in untested populations. To that end, four empirical research articles are presented. First, a test of the cultural life script with an African American sample is presented, followed by a test of the reminiscence effect in which African Americans' memories of unfair treatment across the lifespan are examined. Thus far, very few differences have been observed cross-culturally in tests of the cultural life script and studies of autobiographical recall demonstrating the tendency for the reminiscence effect to occur for emotionally positive, but not emotionally negative, memories. On the one hand, the observed lack of variability may indicate that these are highly stable effects that do not vary regardless of culture. On the other hand, that lack of variability may

suggest instead that the populations examined so far have not varied enough on dimensions relevant to the expression of the life script and reminiscence effect. One such dimension might be whether or not a population is or is not a minority, or more specifically, a historically unfairly treated (i.e., oppressed) minority. No sample examined in prior tests of these effects has been from such a population. Several factors common to the experience of unfairly treated minorities may lead to a higher lifetime prevalence of negative emotional events relative to majority populations. These may include disproportionately lower socioeconomic status (SES), lower levels of educational attainment, higher rates of incarceration, and higher rates of experiencing racial discrimination, a traumatic experience with well-documented, long-lasting effects on one's psychological, as well as physical, well-being. To test the possibility that the makeup of life scripts or the tendency of the reminiscence effect to only occur for emotionally positive memories varies as a function of minority status, Chapters 2 and 3 present the first tests of the life script and the reminiscence effect with a U.S. minority sample, African Americans. These studies represent both the most likely opportunity to observe cross-cultural variability in these effects as well as the best opportunity to support the stability of these effects cross-culturally. If no differences are observed in the current studies, then the cross-cultural stability of these effects would be strongly supported. Therefore, the results of the current studies will be a valuable contribution to our understanding of the cultural life script account and the reminiscence effect either way.

Chapter 4 presents a test of the typicality effect with cultural life scripts. Thus far, evidence for the existence of cultural life scripts independent of the reminiscence

effect has been fairly limited. Mostly, it has consisted of demonstrations of the reminiscence effect in autobiographical recall, the script generation study by Berntsen and Rubin (2004), and a series of studies replicating that procedure (Erdoğan et al, 2008; Rubin et al., 2009; Bohn, 2010; Janssen & Rubin, 2011). If cultural life scripts are in fact represented in memory, then classical effects observed with other forms of scripted information, such as the typicality effect, should occur with life script information. In Chapter 4, two experiments are presented which attempt, for the first time, to extend prior findings with other forms of scripted information to cultural life scripts.

Finally, in Chapter 5 a test of the life story account of reminiscence is reported, which extends prior findings on the life story account to include demonstrations that the dissociation between life story and non-life story events occurs when the life story event status of autobiographical memories is determined based on other qualities of life story events not previously tested. Prior findings supporting the life story account of the reminiscence effect have shown the bump occurs for life story events but not non-life story events when identified based on their level of perceived control: Memories rated high in perceived control produced a bump while those rated low on perceived control do not. Furthermore, emotionally positive events did not produce a bump when rated low on perceived control. However, a high level of perceived control is just one characteristic of life story events. Among other things, they are also highly important to identity development. The research reported in Chapter 5 demonstrates that, in accord with the expectation of the life story account, the reminiscence bump, or at least the upward sloping component, is composed of memories for events rated high in importance to

personality development. As expected, memories for events rated low in importance to identity development, i.e., non-life story events, do not form a reminiscence bump.

Together, the four research articles reported in the following chapters contribute to autobiographical memory research by increasing our understanding of the cultural life script and life story accounts by providing additional evidence by which one can assess their claims and predictions.

CHAPTER 2

CROSS-CULTURAL EFFECTS IN EXPECTATIONS OF THE NORMATIVE LIFE: EXAMINING THE LIFE SCRIPT OF AFRICAN AMERICANS[1]

ABSTRACT

Life scripts are expectations of the timings of important events in the normative life. They are considered to represent an idealized lifecourse, as research has consistently shown they are dominated by emotionally positive events upon whose timings are strongly agreed. However, whether life scripts always represent an idealized lifecourse may not have yet been tested across enough cultures varying in dimensions relevant to their expression, such as increased prevalence of negative emotional events. Unfairly treated minorities, such as African Americans, who have historically faced adverse conditions, such as low SES and racial discrimination, may expect a greater number of negative events to occur in the lifecourse than majority cultures. In the present study, African American adults completed a life script generation task. In order to examine the possible existence of a unique African American life script, half nominated the most important events to happen in the prospective life of a typical infant while half nominated those events for a prototypical infant of *their race*. The findings show that, while most nominated events were positive and that positive events clustered between ages 10 and 30, conforming to prior tests of the life script, events specifically relevant to African Americans were frequently mentioned, many of which reflected adverse conditions they

[1] Coleman, J. T. (2012). Cross-cultural differences in expectations of the normative life: An examination of the life script. Manuscript in preparation.

have faced historically, with more of these mentioned in response to the same race prompt.

INTRODUCTION

One prominent account of the reminiscence effect in autobiographical memory, the disproportionate recall of memories from between ages 10 and 30 for adults over age 40 (Rubin, Wetzler, & Nebes, 1986), is the cultural life script account. The cultural life script account was developed by Rubin and Berntsen (2003) to explain their findings that the reminiscence effect occurs for highly positive, but not highly negative, emotional memories. Early findings demonstrated that the reminiscence effect was a highly robust effect that occurred across a variety of situations (Rubin & Schulkind, 1997a; Rubin & Schulkind, 1997b; Rubin, Rahhal, & Poon, 1998; Jansari & Parkin, 1996). However, it was not until 2002 that evidence was obtained demonstrating that its expression varied as a function of emotional valence. In their study, Berntsen and Rubin (2002) observed that the reminiscence effect occurred for participants' happiest and most important memories, but not for participants most traumatic and saddest memories. In a follow-up study (Rubin & Berntsen, 2003), they found that the reminiscence effect occurs for participants' memories of the instances when they were most proud and most in love, but not for their memories of the times they were most angry and most afraid. These findings were confirmed by subsequent research in which it was repeatedly found that dissociation occurs between distributions of memories of opposing valences. It was observed when participants recalled memories of an instance of when they felt especially good or bad about themselves (Collins, Pillemer, Ivcevic, & Gooze, 2007), when participants recalled their 15 most important memories (Glück & Bluck, 2007), and when participants recalled

as many memories as possible in seven minutes per each five-year lifetime period (Demiray et al., 2009). By demonstrating that this dissociation between remembering positive and negative events occurs across a variety of situations (e.g., populations, cueing techniques), these studies, when taken together, indicate that the finding that the reminiscence effect occurs for emotionally positive, but not emotionally negative, events is a highly robust effect. While several accounts of the reminiscence effect were proposed prior to the observation of this dissociation, the cultural life script account is currently one of the most prominent, because of the growing body of strong evidence in its support, suggesting that cultural life scripts are the mechanism structuring the recall of highly emotional memories leading to this dissociation.

The cultural life script account, which was proposed by Berntsen and Rubin (2004), applies the concept of scripts, as described by Schank and Abelson (1977), to expectations of important events in the normative life. Scripts are generic, cognitive structures that are part of semantic memory which outline the timing and order of events in an event sequence. Based on the premise that the occurrence of important events are prescribed to occur at certain times in life, as discussed by Neugarten, Moore, and Lowe (1965), Berntsen and Rubin proposed the cultural life script, which delineates the timing and order of important life events. However, whereas most scripts individuals possess are the aggregate of numerous personal experiences, the cultural life script is learned vicariously, and is culturally instilled. It is generic and nonpersonal, and not based on the actually lived life, which may deviate from the cultural life script. In order to ascertain the existence of a culturally shared life script, Berntsen and Rubin had Danish undergraduates nominate the seven most important events likely to happen in the

prospective life of a hypothetical newborn baby, estimate the age of occurrence for each event, give a rating of their confidence in their age estimate, and rate the prevalence, emotional valence, and importance of each event. The findings supported their predictions. They demonstrated that the cultural life script was composed mainly of emotionally positive events with strongly agreed upon timings, while emotionally negative events were less frequently mentioned and had poorly agreed upon timings. Moreover, scripted, emotionally positive events occurred mostly in early life, with many clustering in the same 16 to 30 years of age lifetime period covered by the reminiscence bump in autobiographical recall distributions. Events clustering in this lifetime period consisted of major life events, such as having children, marriage, attending college, and falling in love. The ages of occurrence for negative emotional events, on the other hand, were estimated with very poor agreement. Even emotionally negative events that were considered highly likely to occur in life based on their prevalence ratings such as one's own death, the death of one's parents, or other's death had very poor agreement on the timings of their occurrences. Because the distributions of emotional memories in cultural life scripts mapped so well onto those from the autobiographical recall data, Rubin and Berntsen (2003; Berntsen & Rubin, 2004) concluded that cultural life scripts structure autobiographical recall.

Berntsen and Rubin's findings have been replicated in a variety of situations by several studies. Cross-culturally, only negligible differences have been observed between such distinct samples such as Danish (Berntsen & Rubin, 2004; Rubin, Berntsen, & Hutson, 2009), American (Rubin et al., 2009) and Turkish (Erdoğan, Baran, Avlar, Taş, & Tekcan, 2008) undergraduates, and Dutch adults (Janssen & Rubin, 2011). In each

case, the results obtained were consistently mostly positive, with positive events estimated to occur in adolescence and young adulthood with strong agreement, and the ages of occurrence for emotionally negative events estimated with poor agreement. Moreover, there was substantial overlap in the most frequently mentioned events between these studies, with major, emotionally positive life events, such as marriage and having children, consistently being among the most common responses. Very few differences have been observed cross-generationally as well. Studies with Dutch (Janssen & Rubin, 2011) and Danish (Bohn, 2010) samples have compared the cultural life scripts of younger and older adults. While findings show that the older participants produced slightly less idealized life scripts than the younger cohort, overall, there were no major differences in the makeup of their cultural life scripts—they displayed the same properties observed by Berntsen and Rubin (2004). Based on their findings that there were no substantial differences between the cultural life scripts of younger and older participants, Janssen and Rubin concluded that life scripts are indeed a form of semantic memory and not reflective of the personal life as initially claimed by Berntsen and Rubin (2004). Later findings by Bohn and Berntsen (2010) added further support to this claim, when they observed that young children's prospective life stories conformed to the expectations of the cultural life script, even though they were too young to have personally experienced most cultural life script events.

As evidenced by the above-mentioned studies, the body of extant literature has consistently demonstrated that, across cultures and age groups, cultural life scripts invariably possess a stable set of properties (see Rubin et al., 2009 for a review), with potentially the most significant being the manner in which they distribute life events of

opposing emotional valences across the lifespan. However, based on the relatively small number of studies that have tested the properties of cultural life scripts, it may be that the lack of variance observed thus far is because of the failure to test cultural life scripts in enough populations differing in dimensions relevant to their expression. For instance, a likely source of variance in relative rates of expectations of emotionally positive and negative events would be in a population that may experience a higher prevalence of emotionally negative events compared to those previously examined, who ostensibly, vary little on this dimension. The cultural life scripts of such a population may not represent an idealized, emotionally positive life, as has been concluded based on findings thus far. Historically unfairly treated minority groups, such as African Americans, which have not been included in previous tests of the life script, are a likely candidate population to produce variable results, which may contradict the properties of the life script as currently conceived.

While the challenges that African Americans have faced (and continue to face) are well known to Americans, their extent and effects cannot be overstated. Even after enduring centuries of *de jure* oppression, they still face extensive *de facto* discrimination and adverse conditions, especially economically. For instance, in 2009, African Americans made up 25.8% of persons in the United States living below the poverty level, compared to 12.3% for Whites (U.S. Census Bureau, 2010). African Americans are also burdened by lower levels of educational attainment. In 2009, 13.1% of Blacks had no high school diploma, compared to 7.4% of Whites (U. S. Census Bureau, 2010). Additionally, per capita, African Americans are overly represented in the criminal justice system compared to Whites. As of 2010, 4,347 per 100,000 African American U.S.

residents were in state and federal prisons. In comparison, that number was 678 per 100,000 for Whites (Department of Justice, Bureau of Justice Statistics, 2011). All of these factors point overwhelmingly to the prospect that African Americans experience disproportionately higher rates of emotionally negative life events than the majority populations examined in previous tests of the cultural life script, which have been limited to Denmark, the Netherlands, Turkey, and U.S. undergraduates at an elite, private university. This differential rate in emotionally negative events may lead to differences in the expectations of emotionally negative events in the normative life, and possibly, a non-idealized life script. In order to examine this possibility, the current study presents findings from a life script generation procedure similar to that previously employed with majority populations, with African American adults.

METHOD

PARTICIPANTS

A national sample of 270 African American adults completed the study. Participants were enrolled panelists with the company, Survey Monkey, recruited through that company's Survey Monkey Audience service based on meeting the race eligibility criteria. Only data from participants providing responses to all questions are included in the analyses. Data from 15 (5.56%) participants who nominated six or more events occurring under age six were omitted, as this likely indicated a failure to understand the instructions. Therefore, the final data sample consisted of 255 participants. Participants contacted for recruitment were not aware of the reason why they were contacted. A race/ethnicity question on the demographics questionnaire was used to filter out non-

African American participants, who were blocked from completing the study. There were 132 (51.8%) females and 123 (48.2%) males (*M*age = 46.13, *SD* = 14.45, range = 16 to 77). There were 75 (29.4%) participants aged 16 to 37, 117 (45.9%) aged 38 to 57, and 63 (24.7%) aged 58 to 77. Of the 255 participants, 240 (94.1%) were born and raised in the U.S. and 15 (5.9%) responded 'other' for their nationality. Most participants had at least some college education, with 175 (68.63%) either having graduated or attended some college, 46 (18.04%) either graduated from or attended some graduate or professional school, and 34 (13.33%) having a high school diploma or less.

MATERIALS

The study included two questionnaires, (1) a brief demographics questionnaire, which asked participants to provide their age, gender, ethnicity, nationality, and education level, and (2) the life script generation questionnaire. The content of the life script questionnaire was closely modeled after questions used by Berntsen and Rubin (2004), as presented in Study 2 of their article. Participants were first asked to nominate the seven most important events highly likely to happen in a hypothetical infant's prospective life. However, slight alterations were made to implement an experimental manipulation. In order to examine the possibility that there is a unique African American cultural life script, separate from the greater, macro American culture, half of the participants were prompted to list the events most likely to happen to a prototypical infant (Condition 1), while half were prompted to list events most likely to happen to a prototypical infant *of their race or ethnicity* (Condition 2). After omitting invalid responses, the final data sample consisted of 129 (50.6%) receiving the typical

prompt and 126 (49.4%) receiving the typical person of your race and/or ethnicity prompt.

The instructions for nominating events for the two experimental conditions were as follows (with Condition 2 wording in parentheses): "This study is about the shared expectations of an ordinary life course of a typical person (typical person of your race or ethnicity). We will ask you questions about a typical life course and what important events are expected to take place in it. There are no correct or incorrect answers, as we are interested in your opinion. For the first part of the study, imagine a quite ordinary infant boy or girl—choose according to your own gender. It cannot be a specific infant that you know, but a prototypical infant (of your race or ethnicity) with a quite ordinary life course ahead. Your task is to enter the seven most important events that you imagine are highly likely to take place in this prototypical infant's future life. Type each event into one of the seven spaces provided in the same order as they come to your mind. Give each event a short name or title that specifies its content. After this is done, you will begin part two of the study." After nominating the seven events, all participants answered the following five questions in relation to each:

(1) *Age*: At what age is the event expected to take place? (Estimated in years).

(2) *Confidence*: How confident are you that your age estimate is the most likely age at which this event occurs in an individual's life? (1 = *I have absolutely no confidence*; 7 = *I am totally confident*)

(3) *Prevalence*: How common is this event? Out of 100 people, how many will experience this event at least once during their lives? (Pick a number between 1 and 100).

(4) *Emotional valence*: Is the event emotionally positive or negative? (-3 = *very negative*; 0 = *neither positive nor negative*; +3 *very positive*)

(5) *Importance*: How important is this event? (1 = *unimportant*; 7 = *of greatest importance*)

PROCEDURE

Participants were contacted via e-mail with an invitation to participate in the study. Prior to beginning the study, participants were presented with an informed consent form. Upon beginning the study, the first task to be completed was the demographics questionnaire. After reporting their demographic information, participants were then presented the instructions for the *event-nominating task*, in which they nominate the seven events most likely to happen in a hypothetical infant's prospective life. Half of the participants received instructions to nominate these events for *a prototypical infant*, while half received instructions to nominate these events for *a prototypical infant of their race/ethnicity*. After nominating the seven events, the instructions for the *rating task* were presented, in which it was explained how to answer the five questions that would be asked in relation to each nominated event. In the rating task, each event was presented back to the participant on a single page containing the five questions. The order in which the events were presented back to participants was randomized. After answering the 35 questions in relation to the seven nominated events, the study was completed.

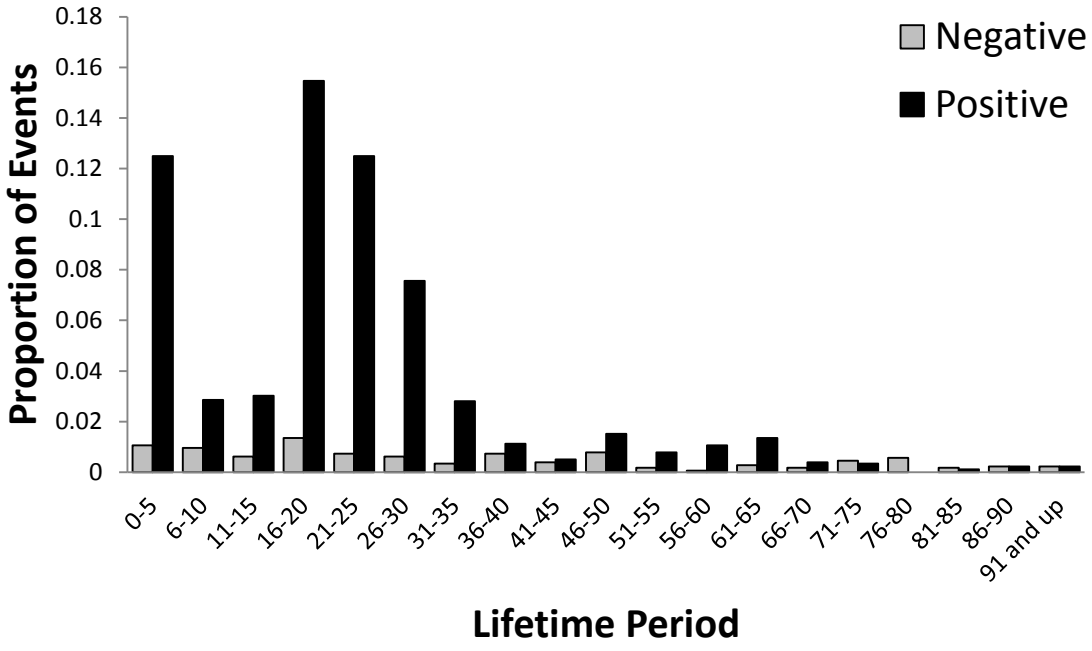
RESULTS

As previously mentioned, the script generation questionnaire required participants to nominate the seven most important events highly likely to happen in the prospective

life of either a prototypical infant or a prototypical infant of the participant's same race and/or ethnicity, then provide an estimate of the likely age of occurrence for each event, a rating of their confidence in their age estimation, and ratings of the prevalence, emotional valence, and importance of each event. In addition to the prompt type comparison groups, results were also examined across age groups. The results include 1785 events (7 each for the 255 participants providing complete data).

Emotional valence was rated on a seven-point scale from -3 to +3. For the purposes of the current analyses, emotional valence was recoded into a 3-group qualitative variable. Events receiving ratings from -3 to -2 were recoded as emotionally negative and those receiving ratings from +2 to +3 were recoded as emotionally positive. Events rated -1 to +1 were recoded as emotionally neutral. Additionally, in order to examine the lifespan distributions of events as a function of emotional valence, as well as mean valence as a function of lifetime period, the lifespan was divided in 19 age bins. Each bin covers a five-year period with the exception of the last, which includes all events estimated to occur at age 91 or older. Figure 1 shows the proportions of emotionally positive and negative events out of all reported events as a function of lifetime period. Conforming to prior tests of the life script, the majority of nominated events were emotionally positive (64.31%). Negative events made up 9.86% of mentions and neutral events made up 25.83%. Further replicating prior findings, the vast majority of emotionally positive events were expected to occur before age 30 (83.80%) and more than half (55.23%) occurred during the bump period of 16 to 30 years of age. Relatively few emotionally positive events were expected to occur after the age of 30 (16.20%). Overall, the distribution of emotionally positive events closely mirrors findings from

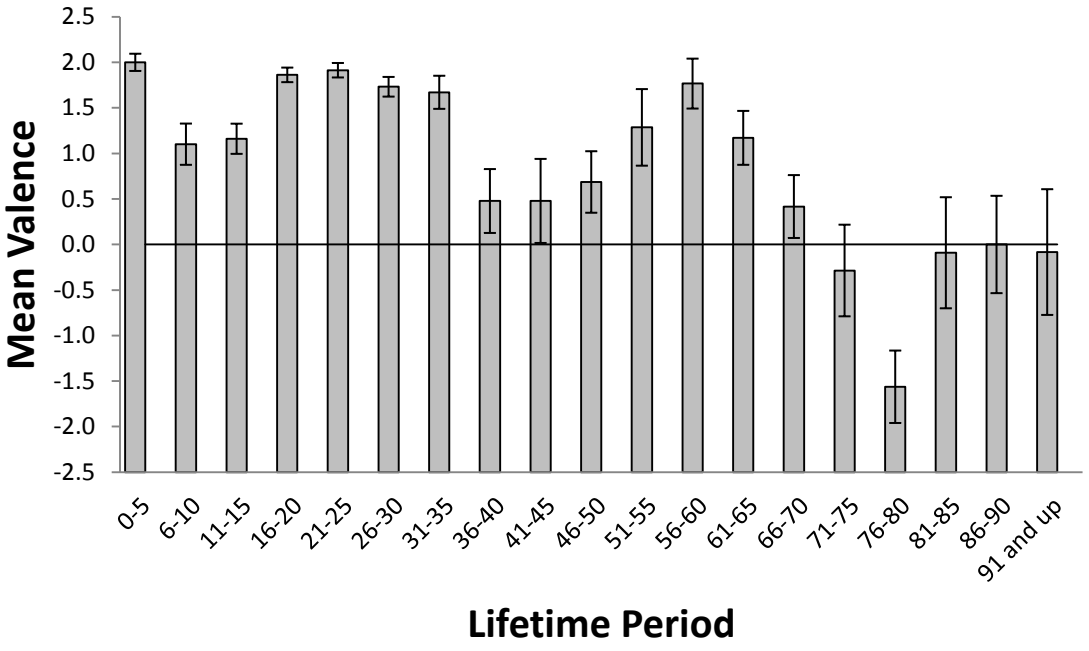
Figure 1. Proportions of positive and negative events a s a function of lifetime period



prior tests of the life script. The distribution of emotionally negative events shows that more than half (53.98%) were expected to occur before age 30, and that participants expected 27.27% of negative events to occur in the bump range of 16 to 30 years of age, and 46.02% to occur after age 30. When combined, 58.87% of emotionally negative and neutral events occurred before age 30.

To further test the life script, mean valence as a function of lifetime period was examined (Figure 2). Because emotionally positive events cluster in early life in the life script, it is expected that the mean valence of the period of childhood to young adulthood (0 to 30) will be significantly higher than that for the remainder of the lifespan. Confirming this expectation, the mean valence of events expected to occur before age 30 (M = 1.78, SD = 1.62) is significantly greater (i.e., more positive) than that for the lifetime period of age 31 and up (M = .78, SD = 2.12), $t(1783) = 9.96$, $p < .001$.

Figure 2. Mean valence as a function of lifetime period



However, in a surprising finding, relatively few lifetime periods possessed negative mean valences. Whereas prior research, such as that by Janssen and Rubin (2011) observed that 9 out of 10 of the five-year lifetime periods after age 35 had negative mean valences, only four five-year lifetime periods in the current study had negative mean valences. The three consecutive five-year bins making up the period of 71 to 85 had negative mean valences, as did the last five-year bin in the distribution, 106 to 110. However, the implications for this finding on the life script and the manner in which it structures recall are limited when considering the paucity of events expected to occur in the 31 years and older period relative to the bump period.

Event categories. As previously mentioned, participants nominated seven important events highly likely to happen in the prospective life of a typical newborn. In order to detect the presence of a life script unique to African Americans, participants

generated the events themselves, i.e., they were not constrained to selecting or categorizing their answers from a list of possible events. While a large proportion of mentioned events fit into existing life event categories used in prior tests of the life script, the results show that participants in the current study mentioned some not previously seen, unique events, ostensibly reflecting actual differences in the shared expectations of important events in the normative African American life. Moreover, many more infrequently mentioned events were observed than found in earlier studies. Compared to studies with Danish (Berntsen & Rubin, 2004), Turkish (Erdoğan et al., 2008), Dutch (Janssen & Rubin, 2011), and American (Rubin et al., 2009) participants, there were substantially more event categories mentioned 5 times or more. Furthermore, in the current study, the proportion of infrequently mentioned events (those mentioned less than five times) is larger relative to the number of overall mentioned events than observed in those studies. The classification procedure in the current study entailed first identifying events belonging to event categories used by Berntsen and Rubin (2004), Rubin et al. (2009), and Janssen and Rubin (2011), then creating novel categories for the remaining events. Some categories that were created which received more than five mentions were not included in the life script, as they could not be considered events per se. There were 33 mentions of activities, such as walking or running, seven mentions of experiencing some form of psychological distress such as anxiety of stress, seven mentions of positive affective states, and seven mentions of negative affective states. In addition, there were 5 mentions of being born into or living in a single parent home, which had a negative mean valence, and quite notably, were all mentioned by participants in Condition 2, those nominating events for a person of their race or ethnicity. The mentioning of a pervasive

social problem that disproportionately affects the African American community for this condition suggests, at least to some extent, the efficacy of this prompt in eliciting a specifically African American life script.

Table 1 presents the most frequently mentioned event categories, their number of mentions, the percentage of participants mentioning them, mean age, standard deviations of age, mean confidence, mean prevalence, mean valence, and mean importance. Using the criteria established in prior research of events mentioned by 4% or more of the sample, there are 29 events that may be considered life script events, or constituting the life script. Additionally, 18 other categories were created which participants reported five times or more, for a total of forty-seven separate event categories mentioned five or more times, with 355 mentions of events categories occurring four times or less. As one would expect based on the wording of the prompt, which asks for the most important events likely to happen in a person's life, the events listed almost uniformly have relatively high ratings of importance, with the exception of a single event. With the sole exception of the anomaly of "first date," which was mentioned 9 times and received a mean importance rating of 1.05, the minimum mean importance rating for events was 4.12 on a seven-point scale. Of the 47 most frequently mentioned events, 36 (67.92%) had emotionally positive mean valences. There was substantial overlap between the most frequently mentioned events in the current study and prior research. The two most frequently mentioned events--marriage and having children--were among the top three most frequently mentioned events for Danes (Berntsen & Rubin, 2004), Turks (Erdoğan et al., 2008), U.S. undergrads (Rubin et al., 2009), and Dutch participants (Janssen & Rubin, 2011) and several of the top ten most mentioned events, including, high school,

college, first job, begin school, and one's own death were among the most frequently mentioned events in those studies as well. In accord with prior findings and the expectations of cultural life scripts, the standard deviations for age estimates were significantly greater for emotionally negative (M = 13.71, SD = 8.79), than emotionally positive (M = 5.72, SD = 5.36), events, $t(45) = 3.69$, $p < .005$, demonstrating that while the ages of occurrence for emotionally positive events are expected, those for emotionally negative events are not. Furthermore, and in accord with the expectations of cultural life scripts, for the most frequently mentioned events, there was a significant negative correlation between the mean confidence ratings (M = 4.94, SD = 1.00) and the standard deviations of the age estimates (M = 29.02, SD = 7.59), $r(1) = -.33$, $p < .05$. As confidence ratings increased, the standard deviations for the age estimates decreased. Among the most frequently mentioned event categories, novel categories include: purchasing and/or obtaining a car, having financial problems and/or experiencing poverty, attending church and/or having a religious experience, losing one's job and/or unemployment, facing discrimination, owning or starting a business, doing poorly academically, playing sports, saving money and/or making investments, and attending graduate or professional school.

Cross-cultural differences. The two main goals of the present study are (1) to examine the cultural life script of African Americans, and to (2) determine if they differ in any significant way from previously examined populations. In order to investigate the second question, the data from the present study were compared to results from four previous studies: (1) Berntsen and Rubin's (2004) study with Danish undergraduates; (2) Erdoğan et al.'s (2008) study with Turkish undergraduates; (3) Rubin et al.'s (2009)

Table 1.
Event Categories, Number of Mentions, Number and Percent of Participants Mentioning Each Event, Mean Age Estimates, Standard Deviation of Age Estimates, Mean Confidence, Mean Prevalence, Mean Valence, and Mean Importance

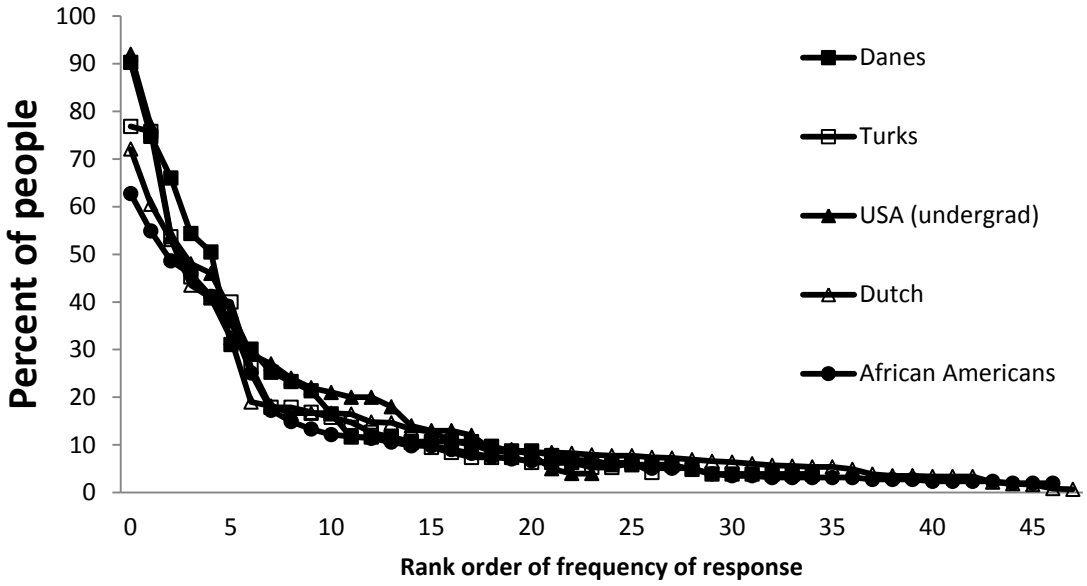
Event Category	# of Mentions	# (%) of PPs Mentioning	Mean Age	SD Age	Mean Confidence	Mean Prevalence	Mean Valence	Mean Importance
Marriage	160	159 (62.35)	26.91	5.26	4.38	58.65	1.70	5.58
Having Children	140	132 (51.76)	26.51	6.20	4.29	64.09	1.88	5.81
High School	124	113 (44.31)	17.77	5.42	6.21	77.13	2.64	6.59
College	117	106 (41.57)	21.51	7.01	5.54	57.54	2.63	6.48
First Job	105	103 (40.39)	19.18	3.01	5.05	74.14	2.09	6.36
Begin School	92	92 (36.08)	4.78	1.00	6.05	90.34	2.12	6.63
Own Death	64	64 (25.10)	77.11	15.32	4.00	94.59	-0.69	5.66
Buy House	44	44 (17.25)	31.75	5.50	4.68	48.93	2.25	5.89
Retirement	38	37 (14.51)	64.68	4.04	4.79	73.00	1.45	5.89
Own Birth	34	34 (13.33)	1.00	0.00	5.97	94.44	2.53	6.94
Begin Walking	31	31 (12.16)	1.55	0.77	5.97	85.42	2.94	6.74
Illness/Hospitalization	30	29 (11.37)	40.43	24.28	4.90	71.23	-1.50	5.30
Travel	29	25 (9.80)	39.72	19.02	5.48	60.69	2.17	5.72
Go to school	27	21 (8.24)	10.81	7.05	5.96	86.26	2.15	6.33
Other's Death	25	24 (9.41)	41.36	29.02	4.04	77.24	-1.76	4.96
Purchase/Obtain Car	25	25 (9.80)	26.60	15.69	5.48	57.56	1.96	5.68
Settle on career	23	23 (9.02)	26.17	4.27	4.57	53.74	2.43	6.43
Financial Problems/Poverty	21	14 (5.49)	26.76	21.17	3.52	61.62	-1.19	5.19
Begin Talking	19	19 (7.45)	2.05	0.71	5.47	87.63	2.74	6.63
Begin Driving	18	17 (6.67)	16.33	1.19	6.11	68.94	2.39	5.94
Divorce	17	17 (6.67)	42.24	18.53	3.65	61.06	-2.12	4.12
Fall in Love	16	16 (6.27)	17.88	4.44	4.56	69.56	1.75	6.06
Grandchildren	16	16 (6.27)	49.50	9.63	4.25	66.25	2.25	6.25
First sex	16	16 (6.27)	16.13	5.57	4.94	86.00	0.75	5.56
Make/Have Friends	16	16 (6.27)	9.13	6.65	5.94	87.31	2.44	6.38
Attend Church/Religion	16	15 (5.88)	19.75	18.83	5.19	61.25	2.38	6.50
Lose Job/Unemployment	13	13 (5.10)	38.62	12.49	2.92	59.00	-2.23	4.69
Independence	13	13 (5.10)	22.54	5.85	4.54	70.38	1.77	6.08
First Boyfriend/Girlfriend	13	13 (5.10)	16.85	4.04	3.23	57.92	1.23	4.85
First Birthday	10	10 (3.92)	1.00	0.00	6.60	86.00	2.70	6.50
Puberty	9	9 (3.53)	11.67	3.57	5.33	88.67	1.22	6.11
First Date	9	9 (3.53)	16.33	1.22	5.44	71.44	1.89	1.05
First Crush	8	8 (3.14)	10.88	2.80	5.13	79.38	0.50	4.25
Face Discrimination	8	4 (1.57)	18.25	2.31	5.50	68.75	-2.75	5.88
Promotion/Pay Raise	8	7 (2.75)	34.00	8.49	5.38	55.63	2.25	6.38
(Have a) Family	8	8 (3.14)	17.88	21.07	5.63	74.88	2.38	6.50
Own/Start Business	8	6 (2.35)	33.75	9.30	6.38	40.38	2.25	6.38
Heartbreak/Romantic Breakup	7	6 (2.35)	19.14	3.34	3.57	84.00	-0.57	5.29
Poor Academics	7	6 (2.35)	14.29	5.62	4.14	52.14	-2.00	5.57
Learn to read and write	7	6 (2.35)	4.29	0.95	5.86	81.86	2.86	7.00
Parent's Death	6	6 (2.35)	56.50	10.46	2.00	87.00	-1.67	4.67
First Kiss	6	6 (2.35)	14.33	1.63	4.17	83.33	2.33	5.67
Crawling	6	6 (2.35)	1.17	0.41	6.67	98.33	3.00	6.67
Accident or Injury	6	6 (2.35)	17.50	8.26	4.67	44.17	-1.00	5.33
Play Sports	5	5 (1.96)	11.20	3.90	4.80	64.60	2.40	5.40
Save /Investment	5	4 (1.57)	26.60	6.50	4.40	53.40	0.60	6.80
Grad/professional school	5	5 (1.96)	27.20	4.92	5.00	40.20	2.00	6.40
Other	355	156 (61.18)	23.66	21.20	5.25	61.95	1.26	5.82

study with American undergraduates; and (4) Janssen and Rubin's (2011) study with Dutch adults. Each utilized the same procedure in which participants nominated the seven most important events highly likely to take place in the life of a typical person. First, the distribution of frequently mentioned events is compared between this and the prior studies. Figure 3 presents the distribution of the proportion of participants mentioning an event plotted by rank order of the frequency of response. The findings show that the most frequently mentioned event in the current study, marriage, was mentioned by substantially less (approximately 63%) of the participants than in prior studies, including that with Turkish subjects, whose most frequently mentioned event was mentioned by roughly 77% of participants. However, by the third or fourth most frequently mentioned event, the proportions of participants mentioning the events become more similar for all studies with the exception of that with a Danish sample, which has slightly higher proportions of subjects mentioning the fourth and fifth most frequently mentioned events. However, overall, the differences in the distributions are mostly negligible, and other than the discrepancy with the proportion of participants mentioning the first most frequently mentioned event in the current study, the lack of substantial differences suggest a similar underlying cognitive structure across each of the investigated samples.

One of the clearest differences between the results of the current, and previous, studies, is the substantially large number of infrequently nominated events. Potentially, this is due to the use of open-ended responses. The study by Janssen and Rubin (2011),

which was the only to include more participants than the current study and to also use internet-based data collection, did not use open-ended responses. Events nominated 4

Figure 3. Rank order of life script events from most to least mentioned plotted by percent of people who mentioned each event for Danish, Turkish, USA undergrad, Dutch, and African American samples



times or less, which made up 19.89% of nominated events, were classified as other, making the number of very infrequently mentioned events in the current study substantially higher than in prior research. Rubin et al. (2009) attributed higher numbers of event categories to less homogeneity in a sample. The fact that the most categories were created for the Dutch sample in Janssen and Rubin's study makes sense then, as it was not restricted to college students, it had the largest participants age range, and had the most participants (n = 595). The sample from the current study shares two of those characteristics, in that it is not restricted to college students and has a large age range. An additional factor that may increase the heterogeneity of sample is the fact that it was a

national sample, which, ostensibly, in the United States could be substantially more heterogeneous in than a national sample from the Netherlands.

Effect of prompt type. In order to examine the possible existence of a unique African American life script separate from the overall macro, American culture, participants were split into two groups. Half of the participants received instructions to nominate the seven most important events highly likely to happen in the prospective life of a prototypical infant, and half received instructions to nominate the seven most important events highly likely to happen in the prospective life of a prototypical infant of the participant's race or ethnicity. Among the 255 participants included in the analyses, 129 (50.6%) received the typical prompt and 126 (49.4%) received the typical person of your race and/or ethnicity prompt.

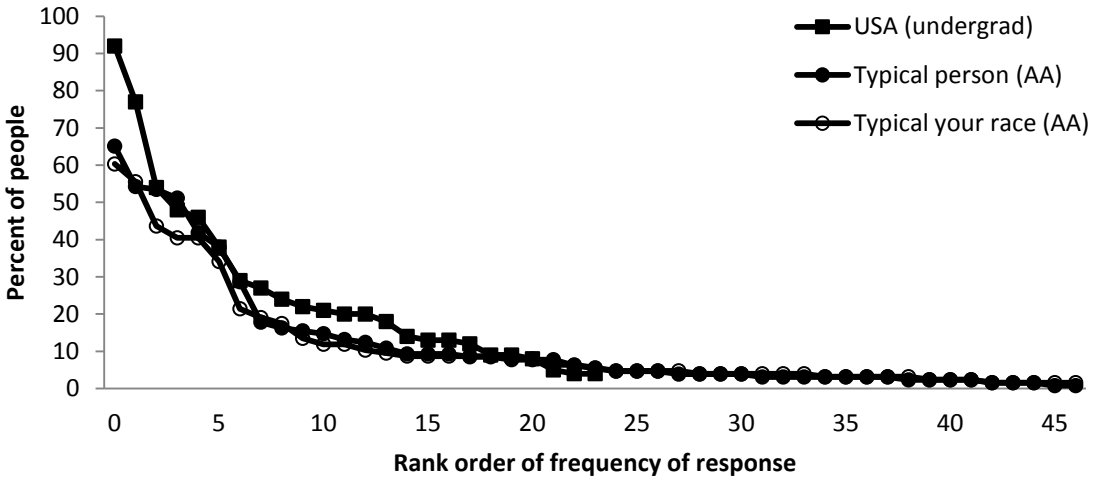
Overall, the distributions of emotional events across the lifespan were highly similar between the two prompt groups. The majority of nominated events for both groups were emotionally positive, with 75.9% of events nominated by the prototypical infant group and 73.4% of the events nominated by the "prototypical infant of your race" group being emotionally positive. The findings show that the distribution of emotionally positive events was heavily skewed toward early life for both conditions, with the prototypical prompt group estimating 86.1% of emotionally positive events to occur before age 30 and the "prototypical infant of your race" prompt group estimating 81.0% of emotionally positive events to occur before age 30. Those in the typical group estimated 55.3% of emotionally positive events to occur in the bump range of 16 to 30 years of age, while those in the typical infant of your race group estimated 56.1% of emotionally positive events to occur in that lifetime period. Both the "prototypical"

prompt group and the "prototypical infant of your race" prompt group estimated the majority of emotionally negative events to occur before age 30 (62.4% and 62.6%, respectively). The prototypical infant prompt group estimated 39.4% of emotionally negative events to occur in the reminiscence bump range of 13 to 30 years of age, while the prototypical infant of your race prompt group estimated 31.5% of nominated emotionally negative events in the that range. Overall, the findings show that the distributions of emotionally positive and negative events for the two comparison groups do not differ substantially from one another or the total sample. Furthermore, there is no significant difference in mean valence of nominated events between the typical person (M = 1.61, SD = 1.76) and typical person of your race (M = 1.51, SD = 1.82) groups, $t(1783) = 1.14$, $p > .05$.

In order to examine further differences between the two prompt groups, the distribution of frequently mentioned life events was compared between the two. Figure 4 presents the distributions of proportions of participants mentioning each event plotted by the rank order of mentions from most to least mentioned for the typical person and typical person or your race prompt groups, as well as that for the USA undergrad sample from Rubin et al. (2009). If the first prompt group, typical person, produced a U.S., rather than an African American, life script, while the second prompt group produced an African American life script, then the distributions for the USA undergrad and typical prompt group should be more similar, while that for the second prompt group should be most unique. The findings show that, overall, the distributions for the two prompt types are relatively similar, and that neither differs substantially from the total, combined sample. As with African Americans in the previous cross-cultural examination, both

groups mentioned the most frequently, and second most frequently, mentioned events substantially less than the USA undergrad sample from the study by Rubin et al. Also

Figure 4. Rank order of life script events from most to least mentioned plotted by percent of people who mentioned each event for USA undergrad, prompt group 1 (typical person), and prompt group 2 (typical person of your race)



similar to the previous comparison, the distributions are mostly similar after the third or fourth most mentioned event. Once again, the findings, with the exception of the first two events, support the premise that there is a similar underlying cognitive structure at work between not only both prompt groups, but between both prompt groups and the USA undergrad sample.

Age effects. Lastly, to examine the effect of age, mentions of the 29 life script events, i.e., those mentioned most frequently, of which there were 1,302, were broken into participant age groups containing roughly equal numbers of cases. Participants in the younger group, aged 16 to 40, made 429 (32.9%) mentions of the 29 life script events, while those in the middle group, aged 41 to 54, made 418 (32.1%), and those in the older

group made 455 (34.9%). Correlations were conducted between the three age groups for the frequency of mentions and each of the five ratings (age estimate, confidence, prevalence, valence, and importance) for the 29 life script events (Table 2). As indicated in the table, all but four of the correlations were significant at the $p < .001$ level. The remaining three were significant at the $p < .005$ level. Overall, the results support the cross-generational stability of the life script, suggesting that it is a form of semantic memory, as opposed to being derived from personal experience.

Table 2.
Correlations of Frequency, Age Estimates, Mean Confidence, Mean Prevalence, Mean Valence, and Mean Importance Between Young, Middle-Aged, and Older Participants Per Life Script Event Category

	Frequency	Age	Confidence	Prevalence	Valence	Importance
			Correlations			
Young-middle	0.949	0.919	0.693	0.717	0.922	0.552*
Young-older	0.920	0.872	0.730	0.569*	0.894	0.611
Middle-older	0.933	0.941	0.728	0.575*	0.956	0.589*

*$p < .005$. All other correlations $p < .001$.

DISCUSSION

The findings of the current study show that, overall, the life script of African Americans did not differ substantially from those of previously investigated populations. One aspect in which it did differ however, was that it included some novel events, which likely reflect genuine differences African Americans' expectations of the events that will occur in one's life. The distribution of emotionally positive events closely matched those observed in the life scripts of Danish (Berntsen & Rubin, 2004; Bohn, 2010), Turkish (Erdoğan et al., 2008), U.S. undergraduate (Rubin et al., 2009), and Dutch (Janssen & Rubin, 2011) samples. As with those studies, emotionally positive events in the current study, were expected to occur mostly before age 30, and most of those occurring in the

period of adolescence and young adulthood, i.e., the bump range. The distribution of emotionally negative events in the current study, however, differed from prior research. In their study with Dutch participants, Janssen and Rubin observed 49.3% of emotionally negative and neutral events occurring at age 30 or younger, while that percentage in the current study is 62.5. Moreover, when examining emotionally negative and neutral events separately, 56.74% of emotionally negative events were expected to occur before age 30. Possibly, these findings are indicative with a tendency for African Americans to associate youth with negative emotional events than the majority populations examined in prior research.

The results of the current study also show that, while there was substantial overlap in the most frequently mentioned events between African Americans and previously investigated populations, the percentage of participants nominating the most frequently mentioned events was substantially lower than observed in previous studies. In the current study, the most frequently nominated event, marriage, was only mentioned by roughly 63% of participants, compared to 77% for Turks and over 90% for both Danes and U.S. undergrads. However, when examining the distributions of the most frequently mentioned events, it is apparent that by the distributions largely overlap by the third or fourth most frequently mentioned event, indicating that, for the most part, the results support a similar underlying cognitive structure at work across the various cultures. The low proportion of participants mentioning the most frequently mentioned event, in conjunction with the findings that there were many more infrequently mentioned event categories in the current study than in past ones, suggests a lack of homogeneity in the sample. Whereas previous research with Danish (Berntsen & Rubin, 2004), Turkish

(Erdoğan et al., 2008), U.S. undergraduates (Rubin et al., 2009), and Dutch adults (Janssen & Rubin, 2011) utilized 35, 27, 24 and 48 (respectively) event categories to classify the most frequently mentioned events, the present study established, based on a combination of events categories from the above studies and newly designated categories, 47 events which were mentioned five or more times. Many infrequent mentions reflected issues specifically relevant to African Americans, and many of these were emotionally negative, reflecting challenges that African Americans face at disproportionately higher rates such as low SES, low levels of educational attainment, and incarceration. Examples of such events nominated by participants include mentions of committing crimes, being in jail, and using drugs. However, more of these were mentioned for the typical person of your race group than the typical person group.

Finally, analyses for the effect of age produced mixed results. Prior research has shown that older participants produce somewhat less idealized scripts than younger ones (Bohn, 2010) in that their life scripts had a greater number of negative events. Contrary to findings with a Danish sample in some events were included in the life script of younger, but not older, participants, and vice versa, none of the examined age groups in the current study failed to include mentions of all of the most frequently mentioned events from the total sample. In the current study, both the younger and older age groups had significantly more positive mean valences for their nominated events than the middle group, meaning that the comparison between the younger and middle group conforms to expectations based on prior research but the middle versus older comparison did not. Furthermore, contradicting expectations based on prior research, the older and younger groups did not have significantly different mean valences for nominated events. The

reason for this finding is unclear. One possibility is that older participants, with greater context in which to consider life, actually develop a more positive perspective on life, while the middle-aged group, currently dealing with the challenges of life, view it more negatively. Research has demonstrated that older adults have a greater bias towards positivity in memory and attention than younger adults (Mather & Carstensen, 2005; Carstensen & Mikels, 2005). However, other results indicate strong agreement on the life script between age groups. Correlations were conducted on frequency of mentions, age estimates, confidence, prevalence, valence, and importance ratings for the most frequently mentioned life script events between age groups. Significant positive correlations were obtained for all, with many of them being strong.

One of the goals of the present study was to determine if there was an African American cultural life script separate from the overall American culture. In order to examine this possibility, half of the participants nominated events to happen in the prospective life of a hypothetical prototypical infant, while the other half did the same for a prototypical infant of their race or ethnicity. There was little difference between the groups with regard to the percentage of participants nominating the more frequently mentioned events. The examination of the distribution of the most frequently mentioned events revealed that the distributions for both groups were similar and that neither differed substantially from the total, combined sample. With the exception of the first few most frequently mentioned events, the distribution of most frequently mentioned events did not differ substantially between either of the two prompt groups or the USA undergrad sample as well. Further demonstrating the similarities between the two

groups, none of the 47 events mentioned five or more times by the total sample was mentioned in one condition, but not the other.

One limitation of the current study is the uncertainty of whether the sample is highly representative of African Americans in general, therefore limiting the conclusions that can be drawn about the existence of a unique, African American life script. Mostly, this is because of the over-representation of participants who had attended college or had a college degree or higher relative to the general population. In the current study, 86.67% of participants had attended or graduated college, while nationally, only 19.8% of African Americans had a college diploma or higher (U.S. Census Bureau, 2012). Moreover, the proportion of participants in the sample with at least some college education is higher than for the overall U.S. population. Potentially, the disproportionate rate of high educational attainment is due to the use of internet-based data collection, and might indicate a relatively high SES level for the sample as well. Educational attainment, SES level, and computer ownership are likely highly correlated. It may be that differential results could be obtained with a sample with lower average education or SES levels, which could potentially lead to an even less idealized life script. Such an investigation would likely have to use a community, rather than an undergrad or internet-based, sample.

Cultural life scripts play an important role in the understanding and processing of life story information. Strong evidence exists that suggests their properties are highly stable across a variety of situations. Investigations of cross-generational and cross-cultural differences have found only negligible differences in the cultural life scripts produced between various groups. Possibly the most important proposed property of life

scripts is that they represent the idealized life and that they favor positive events, as these properties are crucial to accounting for the observed dissociations between distributions of emotionally positive and negative events in autobiographical recall. In some cases, comparisons have demonstrated that some groups produce less idealized scripts than did others, such as with life scripts produced by older and younger participants. In other cases, experimental manipulations, have led to some participants producing less idealized scripts than did others. Such was the case when Erdoğan et al. had participants generate the life scripts of a hypothetical newborn and a hypothetical elderly person, wherein the script for the elderly person was less idealized. In the present study, cultural differences between the overall sample and previously examined populations were evident as well as differences between the two prompt groups. For the most part, these came in the form of mentions of novel events not present in life scripts produced by previously examined majority populations, and more of them being made for the prototypical infant of your race prompt group. Additionally, substantially more emotionally negative and neutral events were expected to occur before age 30 in the current study than in prior research such as that with Dutch participants (Janssen & Rubin, 2011). However, this difference may not lead to changes in the manner in which the life script structures the distribution of emotional autobiographical memories across the lifespan. The findings of the current research demonstrate, that, for the most part, agreement on the timing of emotionally negative events was poor, mirroring the findings of prior research. One exception to this rule was the event of experiencing discrimination. However, the fact that this event was only mentioned eight times and those eight mentions were made by only four participants limits the interpretability of the results for that event. Conversely, emotionally positive

events in the current study, as with other prior tests of the life script, do have strongly agreed timings of occurrence, and because their distribution corresponds well to the examples of the reminiscence bump in autobiographical recall distributions, it would likely lead to the reminiscence effect occurring for emotionally positive, but not emotionally negative, memories, as predicted by the cultural life scripts account of the reminiscence effect.

CHAPTER 3

THE REMINISCENCE EFFECT AND NEGATIVE EMOTIONAL MEMORIES: AFRICAN AMERICANS' MEMORIES OF UNFAIR TREATMENT[2]

ABSTRACT

A sample of 606 African American participants between 38 and 65 years of age reported 1,434 memories of unfair treatment (i.e., discrimination); a negative emotional memory occurring in the domains of employment, housing, resources and money, police and courts, the ages at which they occurred, and the reasons to which they attributed them. The lifespan distributions of memories in various domains and attributed to various reasons showed that, in accord with the expectations of the cultural life script and life story accounts of reminiscence, the classical reminiscence bump was not evident in any of the lifespan distributions of this emotionally negative memory. While the data examined are not directly comparable to most reminiscence effect research because of methodological differences, they provide a useful platform for discussing the potential implications of minority status on autobiographical recall and the cultural life scripts and life story accounts of reminiscence, as well as the effects of using alternative autobiographical cues. Currently, the present study represents the sole examination of the reminiscence effect with an unfairly treated minority population and a U.S. minority. It is the authors' belief that such an investigation is still required as a means of providing

[2] Coleman, J. T., Belli, R. F., & James, S. A. (2012). *Structuring the recall of negative emotional memories: Life scripts, life stories, and memories of unfair treatment.* Manuscript submitted for publication.

the most stringent test of the robustness of the reminiscence effect and claims of its prominent accounts that it is invariant across cultures.

INTRODUCTION

Numerous studies have demonstrated that individuals have a tendency to recall a disproportionately greater number of memories from the period of adolescence to young adulthood relative to other periods of life. This phenomenon, originally discovered in 1986 by Rubin, Wetzler, and Nebes, became known as the "reminiscence bump." This "bump" of memories from adolescence and early adulthood defies expectations of normal forgetting found with other types of memories by not conforming to a monotonically decreasing retention function. The bump has subsequently been observed across a variety of cueing methods and memory types, including word cue methods (Fromholt et al., 2003; Kawasaki, Janssen, & Inoue, 2011; Janssen, Gralak, & Murre, 2011), memory for public events and names (Belli, Schuman, & Jackson, 1997), memory for favorite books, movies, and records (Janssen, Chessa, & Murre, 2007), as well as across several distinct cultures (Conway, Wang, Hanyu, & Haque, 2005; Kawasaki et al., 2011; Berntsen & Rubin, 2002; Glück & Bluck, 2007; Demiray, Gülgöz, & Bluck, 2009). The phenomenon is so reliable as to be considered among the most robust findings in the autobiographical memory literature (Conway & Rubin, 1993; Glück & Bluck, 2007). Early on, several accounts of the bump were developed. Some emphasized the importance of first or new experiences as formative events, which begin the development of nascent memory structures known as schemas (Fitzgerald, 1988; Fromholt & Larsen, 1991; Linton, 1986; Pillemer, Rhinehart, & White, 1986). Rubin, Rahaal, & Poon (1998) offered both a cognitive account and a biological account. In the former, there is a

memory advantage for novel and distinctive events that are followed by a longer period of relative stability, while the latter asserts that the bump simply reflects the naturally occurring biological mechanisms underlying the development and inevitable subsequent decline in cognitive functioning across the lifespan. Conway and Pleydell-Pearce (2000) suggested a narrative account in which memories that reflect personal goals and have a central organizing role in autobiographical knowledge are more accessible. For the most part, memories of this type occur between 10 to 30 years of age, thus causing the reminiscence effect.

More recently, findings have led to yet additional accounts of the reminiscence effect. Several studies have shown that memories from the bump period are disproportionately emotionally positive in valence, while others show that when events are emotionally positive *and* affect later-life outcomes, they tend to be in the bump. Berntsen and Rubin (2002) initially obtained early indications that when participants reported emotional memories, the occurrence of the bump varied as a function of the emotional valence of recalled memories. The bump occurred for highly positive, but not highly negative, emotional memories. Autobiographical cues for emotionally positive events included requests for memories such as when they were happiest, most proud, most in love, and their most important positive memory. Cues to emotionally negative memories included the times when they were saddest, their most traumatic memory, when they were most angry, most afraid, and most jealous (Berntsen & Rubin, 2002; Rubin & Berntsen, 2003). Highly negative emotional memories were either randomly distributed across the lifespan or conformed to a monotonically decreasing retention

function. From these results, they concluded that the reminiscence effect occurred for highly positive, but not highly negative, emotional memories.

Based on these findings, Rubin and Berntsen (2003; Berntsen & Rubin, 2004) formulated the *cultural life script account* of the reminiscence bump as an explanation of the dissociation between the lifespan distributions of memories of opposing emotional valences. According to this account, autobiographical memory recall is structured by cultural life scripts, which provide readily available search descriptions for major life events, most of which are emotionally positive. In contrast to negative events, positive ones reflect the prescribed timings of highly desirable life events of a transitional nature, which cluster during the transition between childhood and adulthood. According to Berntsen and Rubin (2004), a request for extremely negative events would not be likely to activate a life script. This is because such events typically consist of deviations from the timing and sequencing of the life script or nonscripted events.

Additional evidence supporting the existence of cultural life scripts and their structure was later obtained through script-generation studies in which participants placed positive emotional memories mostly within the bump range with high confidence, while negative emotional memories were distributed similarly to the manner observed in the autobiographical recall studies (Rubin & Berntsen, 2003; Berntsen & Rubin, 2004; Erdoğan , Baran, Avlar, Taş, & Tekcan, 2008; Rubin, Berntsen, & Hutson, 2009; Janssen & Rubin, 2011; Bohn, 2010). Notably, the results of Rubin and Berntsen's (2003) initial script-generation task with Danish subjects have been replicated with very little variation. Findings with such distinct populations as Danes (Berntsen & Rubin, 2004; Rubin, Berntsen & Hutson, 2009; Bohn, 2010), Turks (Erdoğan et al., 2008), U.S. undergrads

(Rubin et al., 2009), and the Dutch (Janssen & Rubin, 2011) have consistently demonstrated that the cultural life script is mostly positive, and therefore, represents the idealized life. It should be noted however that cultural life scripts are devoid of negative emotional events. Findings demonstrate that emotionally negative events are included in the life script, and that many of these are rated as being highly prevalent in the normative life. However, the timings of occurrence for these events, which tend to occur mostly after age 30, are not strongly agreed upon, as evidenced by high standard deviations for their age estimates and lower ratings of confidence in those estimates.

Variation has been observed in situations, in which some samples produced less idealized life scripts than others. Coleman (2012) found that when African Americans are prompted to nominate events to happen to someone of their race, more mentions of emotionally negative events are made than when they nominate events to happen to a "typical person." Cross-generational comparisons (Bohn, 2010; Janssen & Rubin, 2011) have demonstrated that the elderly produce a somewhat more negative life script than younger participants. Additionally, the implementation of an experimental manipulation in which some participants nominated events in the prospective life of a hypothetical newborn, while some nominate events they expect to have occurred in the life of a hypothetical elderly person, resulted in a less idealized script for the latter (Erdoğan , et al., 2008). However, the observed differences between these various life scripts are considered relatively negligible—they do not suggest differences in the manner that they structure autobiographical recall distributions.

More recently, Glück and Bluck (2007) have proposed the *life story account* of the reminiscence bump to explain the dissociation between distributions of positive and

negative emotional memories. Inasmuch as both accounts of the reminiscence effect predict that it occurs for highly positive emotional memories, but not for highly negative ones, the two accounts are complementary. However, the life story account, which incorporates aspects of life-span developmental theory, predicts that bump events are not only emotionally positive, but they are also more likely to be developmentally influential and consequential to later life outcomes. In addition, they reflect instances of exerting control over one's life. Life story events enable causal coherence supporting one's life story and serve an explanatory function toward understanding one's life trajectory.

The life story account is supported by autobiographical recall findings with an Austrian sample (Glück & Bluck, 2007) and later further supported in a study utilizing a Turkish sample (Demiray, Gülgöz, & Bluck, 2009). Glück and Bluck had participants report their 15 most important memories and rate the level of perceived control they felt they had over the event, thereby distinguishing life story from non-life story events since life story events are instances of exerting control in one's life. The findings demonstrated that a bump only occurred in the lifespan distributions of positive, high-perceived-control scripted events, whereas the distributions of all other memories (positive low perceived control and all negative events) were relatively flat. Additionally, positive, high-perceived-control scripted events were considered more influential on life outcomes, such as who one has become in comparison to positive low-perceived-control scripted events, and that both types of positive events were considered more influential on life outcomes than both types of negative life events (low perceived control, high-perceived control). Also, in support of the predictions of the life story account, with a Turkish sample, Demiray et al. (2009) found that bump memories were rated significantly more important

for identity development than non-bump memories and that there were significantly more transitional events in the bump, than in the non-bump, ranges of the lifespan.

In this paper, we report research that examines the implications of minority status for the reminiscence effect and the life script and life story accounts of reminiscence. There are key differences between our methods and those implemented by Berntsen and Rubin (2002, 2004; Rubin & Berntsen, 2003), Glück and Bluck (2007), and Demiray et al. (2009). First, whereas the existing research has been based on results derived from non-minority European and Turkish samples, our sample consists of African Americans in the US South, who participated in a lifecourse epidemiological study of cardiovascular disease risk factors (James et al., 2006). Second, the autobiographical cues that we employed differed from those in previous studies. Berntsen and Rubin (2002) used as their autobiographical cues more general affective states, such when one was most happy, most sad and most traumatized. Glück and Bluck (2007) asked respondents to list a specific number of events that they considered as most personally important in their lives. Demiray et al. (2009) requested participants to report any type of memory within specified lifetime periods. Our autobiographical cues consisted of specific situations in which a specific type of negative event occurred, namely occasions in which our respondents had experienced unfair treatment (i.e. discrimination). After reporting our data and results, we provide a discussion of the potential role of culture and racial minority status in autobiographical recall and their implications for accounts of the reminiscence effect.

METHOD

PARTICIPANTS

The current study presents an analysis of secondary data. The participants, who initially took part in an epidemiological study on cardiovascular disease, were 1,169 working and middle-class African American residents of Pitt Count, North Carolina. Of those 1,169 participants, 680 reported memories of unfair treatment (*M*age = 49.61, *SD* = 6.93, range = 38 to 64). There were 433 (63.7%) females and 247 (36.3%) males. Of these participants, 173 (25.4%) had no high school diploma, 252 (37.1%) had a high school diploma, 252 (37.1%) had attended or graduated college. There was no education level data for three participants.

MATERIALS

Trained interviewers recorded participant responses on a lap top computer using Event History Calendar software. Interviewers began by stating: "I am interested in the times during your life when you have been treated unfairly. Think of specific events that have happened to you." Then participants were prompted to report memories separately from different domains of life. For schooling, participants were asked: "Were you ever unfairly treated at school? This includes being given a much lower grade than you deserved, being denied a scholarship that you deserved, being discouraged by a teacher from seeking higher education, or being treated unfairly in some other way." For employment, participants were asked: "Were you ever unfairly treated concerning work? This includes not being hired for a job that you were qualified for, not receiving a promotion that you deserved, being fired from a job unfairly, or being treated unfairly in

some other way." With regard to housing, participants were asked: "Were you ever unfairly treated in getting housing or finding a place to live? This includes being prevented from renting or buying a home, or being prevented from staying in a neighborhood because neighbors made life too uncomfortable." For the domain of resources and money, participants were asked: "Were you ever unfairly treated in getting resources or money? This includes being unfairly denied a bank loan, a credit card, or some other form of credit." With regard to the domain of police or courts, participants were asked: "Were you ever unfairly treated by the police or courts? This includes being unfairly stopped, searched, questioned, physically threatened or abused by police, or being unfairly accused of doing something illegal by the authorities." For each type of event to which participants answered yes, they were asked three follow-up questions: "In what year did this happened?" "What do you think was the main reason for being treated unfairly?" "Was it because of your race, gender, age, height or weight, your shade of color, or some other reason?" It should be noted that shade of skin differs from race: For African Americans, the shade of one's skin is a highly salient issue, as the shade of one's skin may affect the way that Whites treat African Americans and African Americans treat one another, depending on whether one is light- or dark-skinned.

PROCEDURE

Interviewers collected data, face-to-face, in participants' homes. The respondents were asked to report memories of their experiences of unfair treatment, in the domains of schooling, employment, housing, resources and money, and police and courts. For each reported memory, participants reported the age at which it occurred and attributed it to one of six reasons: Race, gender, age, height or weight, shade of skin, or other reasons.

Participants could report as many memories as possible. Respondents also had the option of providing explanations or brief descriptions of the incident.

RESULTS

Six hundred and eighty participants reported a total of 1,875 memories of unfair treatment. Table 1 shows the frequency and percentage of memories by domain and reason. Memories in the domain of schooling, of which there were 441 (23.52%), are omitted from the remaining analyses, due to the temporally constraining/biasing nature of that domain/cue. To detect the presence of a genuine reminiscence effect, it is necessary to employ temporally unbiased autobiographical cues. Cues to when one was in school would inherently lead to the recall of memories constrained to a certain lifetime period (childhood to approximately 18 to 22), and therefore would not be appropriate for testing the reminiscence effect. The remaining cues do not present this problem. The removal of schooling results in a final data sample consisting of 606 (*M*age = 49.48, *SD* = 6.82, range = 38 to 64) participants who reported 1,434 memories of unfair treatment (*M* = 2.37, *SD* = 3.68, range = 1 to 50). One 46-year-old participant reported 50 memories, almost 13 standard deviations above the mean. Out of the 606 participants, 588 (97.00%) reported between 1 and 10 memories, while the other 18 reported between 11 and 50 memories. The domain in which most reported memories of unfair treatment occurred was employment, which made up nearly half (54.60%) of all reported memories. As might be expected with a racial minority, the most common reason to which unfair treatment was attributed was race, making up roughly half (53.84%) of all reports. Reports of unfair treatment in employment attributed to race were the most common combination of domain and reason, making up approximately 30% of all reported

Table 1.
Counts (and Percentages) of Memories by Reason and Situation

		Situation						
		Schooling	Employment	Housing	Resources	Police	Other	Total
Reason								
	Race	146 (7.79)	443 (23.63)	50 (2.67)	98 (5.23)	156 (8.32)	25 (1.33)	918 (48.96)
	Gender	18 (0.96)	27 (1.44)	1 (0.05)	7 (0.37)	6 (0.32)	1 (0.05)	60 (3.20)
	Age	6 (0.32)	14 (0.75)	1 (0.05)	11 (0.59)	2 (0.11)	0	34 (1.81)
	Height/Weight	21 (1.12)	9 (0.48)	0	0	1 (0.05)	1 (0.05)	32 (1.71)
	Shade of Skin	25 (1.33)	42 (2.24)	9 (0.48)	4 (0.21)	9 (0.48)	6 (0.32)	95 (5.07)
	Other	225 (12.00)	248 (13.23)	57 (3.04)	112 (5.97)	46 (2.45)	48 (2.56)	736 (39.25)
	Total	441 (23.52)	783 (41.76)	118 (6.29)	232 (12.37)	220 (11.73)	81 (4.32)	1875

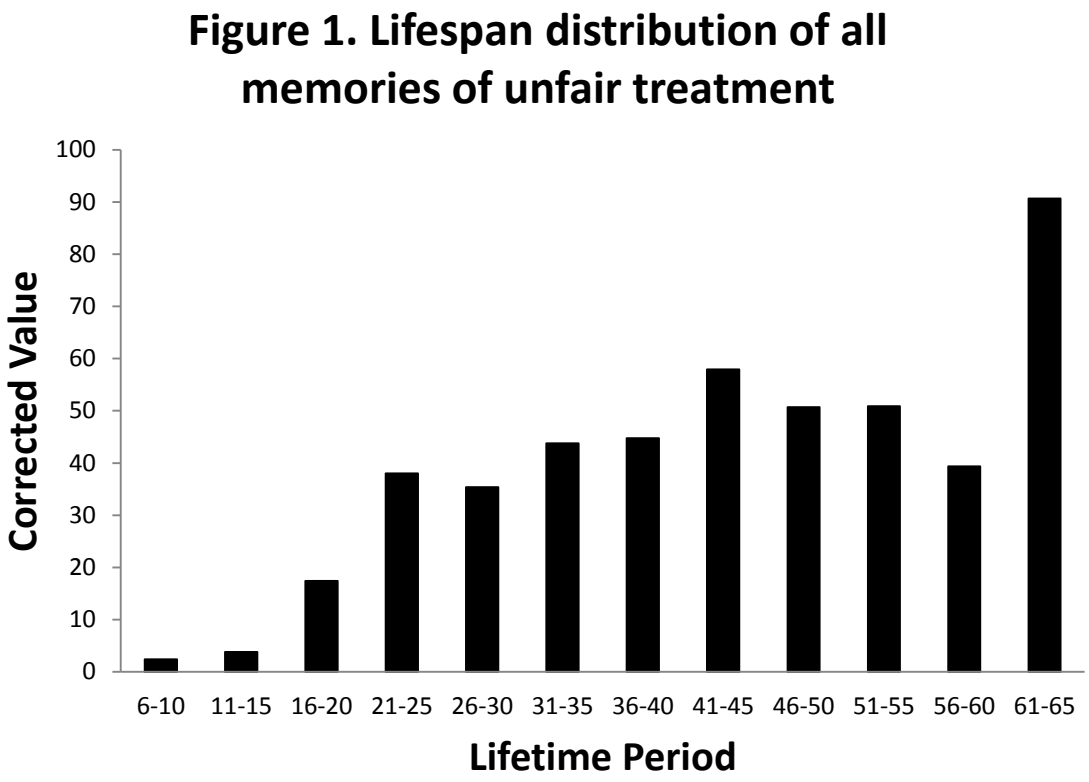
memories. Males reported more memories of unfair treatment attributed to race than other reasons and more unfair treatment attributed to race than females, while females reported more unfair treatment attributed reasons other than race, $X^2(1) = 76.66$, $p < .001$. Females reported more incidents of unfair treatment in employment than males, and more incidents in employment than in all other domains, $X^2(1) = 7.70$, $p < .01$.

The main goal of the current paper is to determine if a reminiscence effect, the disproportionate recall of remote, rather than recent, autobiographical memories, is present in lifespan distributions of memories of unfair treatment, an emotionally negative autobiographical memory. To that end, five distributions will be examined (with schooling omitted from all). First, all reported memories of unfair treatment will be examined, followed by those in employment and those in all other situations, as each of these comprised roughly half of all reports, followed by those attributed to race and all other reasons, as each of these comprised roughly half of all reports.

Because the sample consisted of age groups of unequal sizes, a mathematical procedure was applied to control for this fact, resulting in corrected values that represent results based on an equal number of participants from every age. Potentially, a lack of equal numbers of participants per age (or age group) could result in the presence of bumps at early periods in the lifespan distribution that merely reflect the disproportionate recall of late life memories by a younger age group. Prior research, such as that by Berntsen and Rubin (2002) used mathematical procedures to extrapolate expected numbers of memories, which were then reported in the results. In their procedure, Rubin and Berntsen corrected the number of memories to represent the number of memories that would have occurred had the participants from each 10-year age group lived through

the whole decade instead of only partially through that decade. The same procedure is not appropriate in the current study since age groups are not being looked at separately. However, the similarity between the two procedures is that both extrapolate an expected number of memories based on ideal samples from the data to control for the shortcomings of actual sample. To conduct the analyses in the current study, the number of memories from each age of occurrence was looked at individually for each participant age. This number was multiplied by the quotient of the number of participants in the total sample divided by the number of participants in the sample old enough to have reported memories from a given age. For instance, 606 participants could report memories of unfair treatment up to age 38, as that is the age of the youngest participant. From age 39 and up, only a portion of the entire sample is able to report a memory from each age. Only 601 participants were old enough to report memories from age 39, therefore the number of memories at age 39 is multiplied by 1.008 (606/601). Similarly, as only two participants aged 65 were in the sample, then the number of memories from age 65 would be multiplied by 303 (606/2). The result is corrected values that are counts of the number of memories from each age that represent the results based on 606 participants old enough to report from each age. In addition, the lifespan distribution is broken into 5-year bins (e.g., 6-10, 11-15, 16-20, etc…). The value for each 5-year bin represents the mean corrected value for those five years.

First, the distribution of all reported memories of unfair treatment is examined. Figure 1 shows the average corrected number of reported memories as a function of lifetime period with the lifespan divided into 5-year bins. Notably, a reminiscence effect along the lines of that most commonly observed, i.e., occurring between ages 10 and 30,



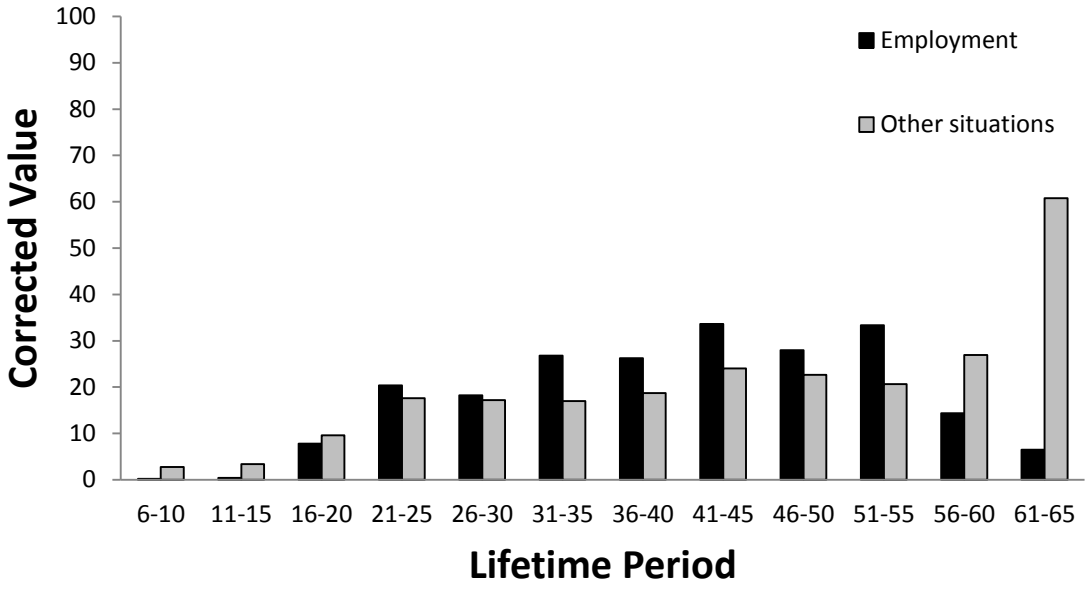
is not present. Prior research has consistently demonstrated a substantial drop-off in the number of reported memories occurring after age 30. In contrast, the results show that substantially more memories were reported from ages 31 to 35 than from 26 to 30, and that the number of memories increases over the next 2 successive lifetime periods, 36 to 40 and 41 to 45. While a decrease in reported memories occurs after the 41 to 45 lifetime period, the presence of more reported memories from the 46 to 50 and 51 to 55 lifetime periods than from between ages 10 and 30 further demonstrates the lack of a reminiscence effect.

Next, the distributions of memories in the domain of employment and all other domains are examined (Figure 2). Seven hundred and eighty three (54.60%) memories were reported in employment. The results show that, contrary to expectations, no

reminiscence effect was observed. Rather than a decrease in reported memories after age 30, as would be expected with the reminiscence effect, there is instead, an increase in reported memories in the 31 to 35 lifetime period. This is followed by a period extending up to age 55 from which more memories were reported than from the 10 to 30 year-old period, contradicting the expectations of the reminiscence bump. The distribution of memories in domains other than employment, of which there were 651 (45.40%), does not demonstrate greater recall of remote memories relative to recent ones either. The observed distribution differs from the commonly observed reminiscence bump in several ways. First, no decrease in the number of reported memories occurs after the 26 to 30 lifetime period. Instead, an almost equal number of memories are reported in the following lifetime period, 31 to 35. Second, more memories were reported from the period of 36 to 40 than from 31 to 35. Third, more memories are reported from the lifetime periods between ages 41 and 60 than from all early lifetime periods. Even if the most recent lifetime period, 61 to 65, were discounted to account for the recency effect, the remainder of the distribution, for the most part, conforms to a monotonically decreasing retention function.

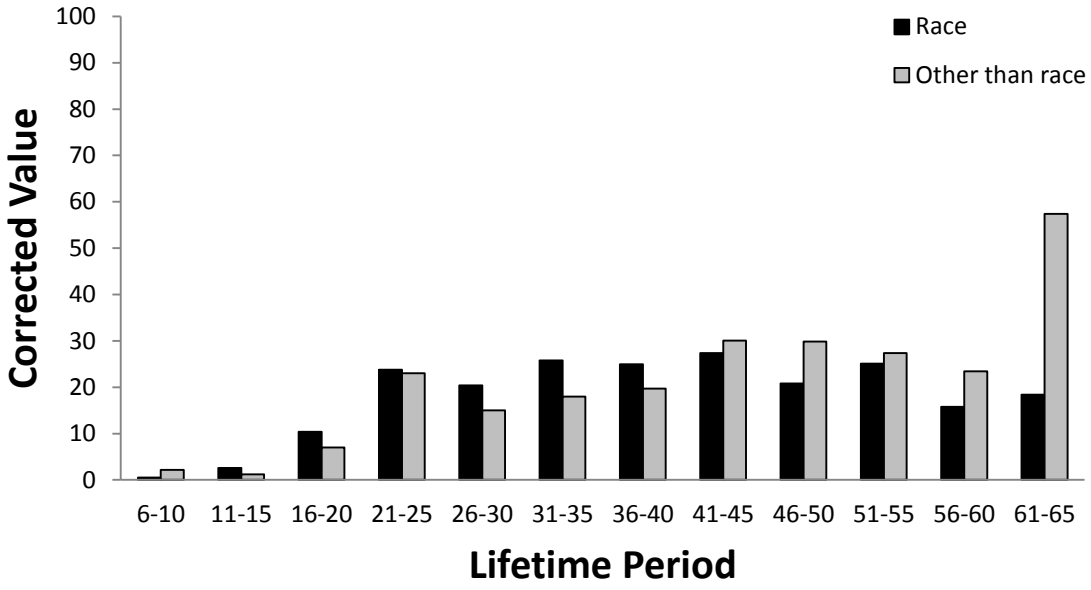
Figure 3 shows the distributions of all memories of unfair treatment attributed to race and those attributed to reasons other than race. There were 772 (53.84%) memories of unfair treatment attributed to race. The results show that more memories were reported from 31 to 35 than from 26 to 30, a roughly equal number of memories were reported from 36 to 40 than from 31 to 35, and that more memories were reported from 41 to 45 than from the preceding period. As such, the results clearly indicate that a reminiscence bump between ages 10 and 30 is not present. The increase in reported

Figure 2. Lifespan distributions of memories of unfair treatment in employment and all other situations



memories between ages 51 and 55 compared to the prior lifetime period of 46 to 50, and the occurrence of roughly equal numbers of reported memories among the periods of 21 to 25, 31 to 35, 36 to 40, and 51 to 55, further demonstrates no tendency for participants to recall remote, rather than recent, memories. In examining the distribution of memories attributed to reasons other than race, if the last lifetime period, 61 to 65 were discounted to account for the recency effect, the most reported memories are from the lifetime periods of 41 to 45 and 46 to 50, from which about roughly equal numbers of memories were reported, demonstrating that the classic reminiscence bump occurring between ages 10 and 30 is not present. The lack of a classic reminiscence bump is further illustrated by the greater number of memories reported from the lifetime periods of 31 to 35 and 36 to

Figure 3. Lifespan distributions of memories of unfair treatment attributed to race and all other reasons



40 than from 26 to 30. Moreover, the number of reported memories increases from the period of 31 to 35 to that of 36 to 40.

DISCUSSION

The goal of the current research is to determine if a reminiscence effect would be observed in African Americans' memories of unfair treatment, a negative emotional memory, thereby contradicting the predictions of the cultural life script and life story accounts of the reminiscence effect and findings from prior research. Previous studies have demonstrated that the reminiscence effect does not occur for highly negative emotional memories, with the exception of history-graded events or as in the case of memories of when one was most jealous, which was confounded with times when one was most in love. In a somewhat similar manner, the cultural life script account can

explain reminiscence for emotionally negative events in cases of unfulfilled life script events, (e.g., failure to graduate high on time with one's peers, which would occur at age 18). Potentially, many unfulfilled life script events could occur for disadvantaged minority groups, such as African Americans. U.S. Census Bureau data shows that as recently as 2009, African Americans made up 25.8% of Americans living below the poverty level, compared to 12.3% for Whites (U.S. Census Bureau, 2010). With regard to education, 13.1% of African Americans had no high school diploma compared to 7.4% of Whites (U.S. Census Bureau, 2010). African Americans are also overrepresented in the U.S. prison population. The number of African Americans in state and federal prisons is 4,347 per 100,000 compared to 678 per 100,000 for Whites. Several of these statistics suggest ways that life script events might go unfulfilled for a larger percentage of African Americans compared to Whites. Failure to obtain a high school diploma is one example of failure to fulfill a life script event that would lead to the recall of an emotionally negative memory occurring precisely around age 18. Low SES might indicate that one failed to obtain successfully their first job when they wanted, or begin a desirable career. Examples of failing to fulfill life script events such as these could also lead to the recall of emotionally negative events with relatively precise timings of occurrence, specifically in young adulthood.

In the current study, the commonly observed reminiscence effect displaying a bump between ages 10 and 30 was not observed in any of the examined lifespan distributions. Even in cases in which more memories were reported from remote, as opposed to recent, lifetime periods, the distributions failed to conform to the expectations of the classical reminiscence bump in that they did not terminate at the appropriate

lifetime period, 25 to 30, and the number of reported memories in the last 20 years of life was not substantially smaller than that for the bump period. While no evidence contradicting prominent accounts of the reminiscence effect or prior findings was obtained, the findings of the current study do not allow for any definitive conclusions about the effect of minority status on reminiscence. As it stands, that effect remains uncertain, as the present study was not directly comparable to existing tests of the reminiscence effect. Findings by Coleman (2012) have demonstrated differences in the distribution of emotionally negative events in the life script of African Americans relative to the findings of prior research with majority populations. Substantially more negative events were estimated to occur before age 30 than in prior studies. However, because the timings of these events were not strongly agreed upon, i.e., prescribed, it would be expected that this should not translate into differences in autobiographical recall. Nevertheless, until this is empirically demonstrated, that remains an unconfirmed expectation/prediction of the cultural life script account.

Examining the reminiscence effect in the autobiographical recall of African Americans remains an important, incomplete test of the cultural life scripts and life story accounts. In the present study, we attempted, by conducting secondary analyses on already collected data, to determine if African Americans' memories of unfair treatment produce a reminiscence effect, despite the fact that these data were not collected expressly for that purpose. We were able to analyze autobiographical memories from a population that varies from those previously examined on at least one important dimension, that, ostensibly, is relevant to the expression of the reminiscence effect, minority status. It is the contention of the authors that, inasmuch as the life script, which

is responsible for structuring the recall of highly emotional memories, is an expression of expectations of events in the normative life, then differential rates in actually-occurring emotional events between populations could translate into variability in the life script. That is to say, if a given culture experiences more emotionally negative events compared to another, then, potentially, those experiences would, at a minimum, decrease the idealized nature of the life script, or, in the most extreme cases, lead to a predominantly emotionally negative life script. A factor well known in the United States to be strongly predictive of a variety of adverse life conditions is race and/or ethnicity. Historically, U.S. minority groups have faced substantial adversity, socially and economically. As recently as 2009, African Americans made up 25.8% of persons below the poverty level, compared to 12.3% for Whites (U.S. Census Bureau, 2010). Additionally, data from the same year indicate that 13.1% of blacks had no high school diploma, compared to 7.4% for Whites. African Americans are also disproportionately represented among state and federal prisoners in the U.S. As of 2010, there were 4,347 African Americans in state and federal prisons per 100,000 U.S. residents, compared to 678 for Whites (Department of Justice, Bureau of Justice Statistics, 2011). Another prevalent problem among the African American community is the high rate of single-parent homes. According to U.S. Census data, 59% of African American "family groups," i.e., homes with children under 18 years of age, were "one-parent family groups," compared to 26% for White family groups (U.S. Census Bureau, 2010). From these conditions, emotionally negative events may result, such as deprivation, hunger, lack of security, exposure to unsafe situations, experiences of discrimination, and health disparities, among others. Moreover, these factors may be exacerbated in samples with even lower levels of socioeconomic status,

something unlikely addressed in the current study, which consisted of working and middle-class participants.

The autobiographical cues employed in the current study--requests for memories of unfair treatment--are appropriate variables in an examination of cardiovascular disease and hypertension among African Americans. Unfortunately, they are less so for a test of the reminiscence effect. As such, they do not provide a test of the reminiscence effect comparable to existing ones. No previous study constrained all responses only to emotionally negative events, nor has any specified from which domains of life participants are to sample memories. Tests of the reminiscence effect require more neutral autobiographical cues for which fewer *a priori* assumptions can be made about the responses to be elicited, thereby demonstrating a more genuine effect, rather than an artifact of the cueing method. Moreover, the limited age range of the sample and the lack of equal numbers of participants per age group further diminished the prospects of observing a genuine reminiscence effect.

With the exception of history-graded events, such as those for memories of World War II by Danish participants (Rubin & Berntsen, 2003), and memories of jealousy, which were confounded with times when participants were most in love (Rubin & Berntsen, 2003), no studies have demonstrated reminiscence bumps for emotionally negative memories. As such, both the cultural life scripts and life story accounts of the reminiscence effect have withstood a substantial number of tests of what is likely their central, and most important, theoretical claim: that the reminiscence effect occurs for emotionally positive, but not emotionally negative, memories, an effect that each explains effectively. Based on the research to date, proponents of the cultural life script and life

story accounts have a strong claim to the soundness of those accounts. However, a strong claim may also be made that there has not been enough variability in the populations in which their accounts have been tested to confirm fully their robustness and that of the effects they predict. A test of the reminiscence effect with an African American sample could dispel such uncertainty.

CHAPTER 4

DOES ITEM TYPICALITY AFFECT MEMORY FOR LIFE SCRIPT EVENTS?[3]

ABSTRACT

Recently, a life-scripts account has been utilized to explain the structure of autobiographical memory recall. However, whether life-scripts exist has never been directly tested. If individuals possess scripts for the normative timing and order of life events, then ostensibly, the classical effects found in memory experiments for other types of scripted information, such as the typicality effect, should generalize to life-scripts. The present paper presents two experiments examining this issue. In Experiment 1, participants heard brief biographies in which life events varied in typicality as a function of age appropriateness. Recognition memory for presented and unpresented items was tested. Participants correctly recognized more atypical, than typical, items, and recognized falsely more typical, than atypical, ones. Additionally, participants' reports of the subjective experience of remembering life-script events as a function of typicality replicated previous findings. Experiment 2 was conducted to address potential confounds in Experiment 1. Participants listened to brief biographies containing unscripted life events varying as a function of emotional valence and occurring at various ages. It was expected that no differences in recognition memory would occur as a function of emotion or age, thereby demonstrating that the effects in Experiment 1 were driven by typicality, and not these factors. Surprisingly, the results were mixed. In some cases, recognition was better for events in lifetime periods more commonly associated with the opposite emotional valence of the event. The occurrence of the typicality effect for unscripted

[3] Coleman, J. T., & Belli, R. F. (2012). *Does item typicality affect memory for life script events?* Manuscript invited for resubmission.

events suggests that general knowledge associating a particular emotional valence with one lifetime period more than another was activated, rather than a script. The status of the life script is discussed in light of these findings.

INTRODUCTION

Recently, several studies have utilized a life-scripts account to explain the structure of autobiographical memory-recall distributions for different classes of emotional memories (Rubin & Berntsen, 2003; Berntsen & Rubin, 2004; Collins, Pillemer, Ivcevic, & Gooze, 2007). The observed pattern for these distributions consists of a reminiscence effect, whereby a bump occurs in the period of adolescence to young adulthood in which more memories are recalled, and the bump is observed only for positive events. Negative events, on the other hand, are distributed randomly across the lifespan. This pattern was observed when a large samples of Danish participants recalled the age of occurrence for their happiest, saddest, most traumatic and most important memories (Berntsen & Rubin, 2002) and memories for the times they were most afraid, most proud, most jealous, most in love, and most angry(Berntsen & Rubin, 2003). Additionally, it was also observed when U.S. undergrads and middle-aged adults recalled times the felt especially good and especially bad about themselves (Collins et al., 2007).

One possibility that could account for these distributions is a life-script account. According to this account, life-scripts, generic cognitive structures constituted of culturally prescribed age norms for life events, guide recall by indicating when one is most likely to have experienced different classes of emotional events, thereby increasing the likelihood of recall for certain events above others. Cultural life scripts influence the encoding and retrieval of these events through emphasizing their importance, which in

turn increases rehearsal of those memories. Rehearsal of these culturally desirable events increases the depth of processing and number of spaced-retrievals they undergo, which are both memory-enhancing processes. To bolster the life-script notion, several studies sought evidence for the existence of shared life-scripts, mostly by having participants generate lists of events that would occur in the lives of hypothetical individuals. Danish participants asked to predict the age of occurrence for events in the life of a hypothetical elderly person generated more positive than negative life events, and most of the positive events were located within the bump range (Rubin & Berntsen, 2003). The emotional positive events had highly prescribed timings, while the timings of occurrence for emotionally negative events were estimated with poor agreement as indicated by the standard deviations of the age estimates. In a separate study, when Danish participants predicted the seven most important events to occur in the prospective life of a hypothetical newborn, there were also more positive, than negative, events. Moreover, emotionally positive events had highly prescribed timings, while the timings of occurrence for emotionally negative events were estimated with poor agreement, as indicated by the standard deviations of the age estimates (Berntsen & Rubin, 2004). Similar findings were obtained in a study with a sample of Turkish university students (Erdoğan , Baran, Avlar, Taş, & Teckan, 2006), a Dutch national sample of young and old participants (Janssen & Rubin, 2011), young and old Danish participants (Bohn, 2010), and with a U.S. undergraduate sample, (Rubin, Berntsen, & Hutson, 2009).

Overall, the findings of these studies suggest that the properties of the cultural life scripts are highly stable. Only minor differences were observed across cultures, cross-generationally (Bohn, 2010; Janssen & Rubin, 2011), and across education levels

(Janssen & Rubin, 2010). In all cases, the life script possessed the same properties: (1) they favored youth, with the majority of events occurring between ages 10 and 30; (2) emotionally positive events clustered between ages 10 and 30; (3) the timings of occurrence for emotionally positive events are highly prescribed, while agreement on the timings of occurrence for emotionally negative events is poor. Because of these properties, cultural life scripts are considered to represent idealized lives. Because the manner in which emotional events are distributed and the differences in the agreement of the timings of occurrence between emotionally positive and negative events, the cultural life-script account has the distinct ability to explain with great parsimony both the position of the bump in the lifespan and the dissociation between the distributions of positive and negative emotional memories. Because of this, Berntsen and Rubin (2004) concluded that life-scripts structure autobiographical memory recall, but only for highly positive, not highly negative, emotional memories. However, other possible forms of evidence supporting the existence of cultural life scripts still remain to be obtained.

Because a vast body of research pertaining to the existence and implications of script knowledge already exists, but little has been done employing these established paradigms in the study of life-scripts, more direct testing of the existence of life-scripts is possible. Generalizing the classical effects found for memory for other types of scripted information to that for life-scripts would provide an additional class of evidence for their existence, independent of findings pertaining to the bump in autobiographical memory recall that would greatly bolster assertions that life-scripts are represented in memory, and consequently lend greater credence to the possibility that they structure autobiographical memory recall. One possible direction to pursue would be to examine

the influence of life scripts on the tendency to confuse foils with previously presented events, a phenomenon known as the *typicality effect*. If indeed, life-scripts do exist, then ostensibly, the typicality effect will be found with life script information. A substantial body of research has demonstrated that the typicality effect has been shown to reliably occur with other types of scripts (Graesser, Gordon, & Sawyer, 1979; Graesser, Woll, Kowalski, & Smith, 1980; Smith & Graesser, 1981; Lampinen, Faries, Neuschatz, & Toglia, 2000). The typicality effect is characterized by superior recognition memory for atypical items relative to typical ones in scripted event sequences, and more unpresented typical items being falsely recognized than atypical ones. This effect has been found to occur with both adults (Graesser et al., 1979; Bower, Black & Turner, 1979) and young children (Hudson, 1988; Adams & Worden, 1986).

Life-scripts are considered to be culturally shared knowledge structures, or schemata that, as with other forms of scripts, are conceptual representations of stereotyped event sequences (Abelson, 1981). They delineate the normative timing and order of the events/actions that constitute a larger overall event sequence and are generic, representing a prototypical instantiation of that sequence. Scripts help to guide interpretations, inferences, expectations, attention, encoding, and retrieval (Schank & Abelson, 1977). Evidence suggests that children as young as kindergarten age utilize scripts representing common routines, such as the events that make up the school day (Fivush, 1984). Superior memory for atypical/aschematic items has been explained in several different accounts. The attention elaboration hypothesis (AEH), a level of processing explanation, states that the depth of cognitive processing determines the likelihood of future retrieval. With scripted information, atypical information attracts

more attention because it has a low a priori probability of occurring in an activated script, therefore requiring greater effort and elaborative processes to reconcile its occurrence in its context than with respect to script-typical information. In this regard, an atypical behavior in a biography, such as say, an 80-year-old surfing or a 20 year old who lives in a nursing home, would have a low *a priori* probability of occurring in the script activated by this material and therefore engage greater depth of processing enhancing later memorability.

Another account of the typicality effect asserts that memories for event sequences are schematically organized around script expectations and therefore, script violations maintain a distinct status. The script pointer + tag (SP+T) hypothesis (Schank & Abelson, 1977) states that episodic memories for events have a pointer to the appropriate underlying script, which contains the constituent typical actions and "tags" for script violations, where they are stored as functionally separate units. In the case of the life of an 80 year old, surfing would be explicitly stored as it is not part of the script for what elderly people do. The theory makes two critical predictions: (1) memory discriminations will be superior for actions that are atypical, compared to those for actions that are typical because they have to be explicitly stored as they are neither implied nor inferred by the underlying script, and (2) there should be no memory discrimination for actions that are highly typical of the activated script because they are interrelated to the underlying script as a whole and are all contained in a single pointer toward the appropriate script. An example of the latter prediction in which typicality is determined by age appropriateness would be going to college for a young adult. Findings from prior life script generation procedure indicate that going to college is a common life

script event whose timing is highly prescribed. If cultural life scripts were represented in memory in the form observed in these studies, would be part of the activated underlying script, and therefore not be stored separately/explicitly.

The script pointer plus tag hypothesis (SCPT), in addition to having implications for the superior recognition of atypical events, further describes the way in which unpresented typical items are more likely to be falsely recognized than unpresented atypical items. This hypothesis states that memory representations of script-based sequences are made automatically and consist of a copy of the script, including its constituent, highly typical actions, regardless of whether or not they are presented. Consequently, if a script only contains a subset of the script-typical items, subjects should later be unable to distinguish between those items that were presented and those that were not. With regard to the life script, if information that a young person went to college was presented but it was not mentioned in that person's biography that she or he attended high school in adolescence, high school would still be activated according to this account, later making if indistinguishable from material that was presented. As before, the atypical items that are encountered are stored as "tagged" items, a status facilitating subsequent superior memorability. The script pointer+tag model also makes several predictions regarding the effect of retention interval length on memory for script information as function of typicality. As retention interval increases, scripts are increasingly relied upon in facilitating inferentially driven retrieval whereas, at shorter intervals, memory is retrieved more from the actual memory trace (Smith & Graesser, 1981). Testing at two-day, one-week and three-week intervals has shown that, while retention of atypical actions was superior to that for typical ones, atypical actions were forgotten at a faster

rate. However, correct recognition and correct rejection are both superior when tested immediately, compared to when tested after 24 hours (Lampinen et al., 2000).

Another aspect of remembering affected by item typicality is the phenomenological experience of recalling scripted events. The dynamic memory model (DMM) (Schank, 1982) makes several predictions pertaining to the phenomenological experience of recalling atypical versus typical script events. It states that more experientially vivid recollections should accompany memories for atypical actions/items than for typical ones. Moreover, they should have more thought and emotion details associated with them. Script violations require extra effort at encoding to reconcile their presence. The reconciliation process would be memorable in and of itself, and the details, thoughts, and other aspects associated with one's reaction when that item was encountered would subsequently be stored with its memory.

To investigate the subjective experience of recalling false memories, Tulving (1985) outlined the Remember/Know distinction, which has subsequently been employed in recognition memory tests to distinguish true memories from false ones. Remember judgments are for those memories for which subjects can recall details of the encoding experience. On the other hand, know judgments apply to situations in which one has a subjective sense that she or he knows a fact, but cannot recall any of the details of the actual encoding experience. Knowing, according to Tulving, lacks consciousness of the original event because it is generated internally rather than externally. Findings show that more remember judgments are made for atypical items and more know and infer judgments are made for typical items (Lampinen et al., 2000). Infer judgments are likely for activated, non-presented items commonly associated with scripts whose presence are

implied, as would be the case with the above-mentioned example of the fact that going to high school was omitted from the biography of a young person. The presence of specific details accompanying remember judgments may vary as a function of item typicality and also can be used to distinguish between true and false memories. More memory details are reported for remember judgments of atypical than typical items (Lampinen et al., 2000). Findings indicate that the phenomenological experience of remembering true memories versus false memories varies in that more remember judgments are made for true than false memories (Lampinen, et al., 2000), reflecting the externally generated nature of true memories versus the internally generated nature of false ones.

The present research utilizes the abovementioned previous findings regarding the typicality effect and the variations in the phenomenological experience of remembering scripted information as a function of typicality to determine if these findings hold true for life-script information. Scripts are generic cognitive representations in semantic memory that when activated affect attention, encoding, and retrieval. One demonstration of the effect of script knowledge is the typicality effect. The activated script inherently includes items, which if not presented might be falsely remembered, and makes atypical items more noticeable. If a script for a certain event sequence does not exist (i.e., is not represented in semantic memory) then effects associated with script knowledge should not happen with information about that event sequence. Conversely, demonstrating that effects associated with scripts do occur for with those event sequences should indicate its existence. Replicating the typicality effect with life-script information will further establish that important events in the normative life are indeed organized schematically in a script represented in memory, as argued by Rubin and Berntsen (2003). To examine

this issue, the present paper presents two experiments. In Experiment 1, subjects listened to the biographies of fictional characters. Audio recordings consisting of narratives delineating chronologically the events in the lives of two characters were played for participants, with one young character, for which the events from birth to approximately 30 years of age are chronicled, and one old character, for which the events of the period from approximately 45 to 75 years of age are presented. Life-event items varied in typicality based on whether they were consistent or inconsistent with the activities of a person that age. After listening to the narratives, participants were given recognition tests both 10 minutes and 24 hours later containing items that were either presented in the source material or not. Participants indicated whether the event was presented or not presented, whether they remembered, knew or inferred that it was presented, and if they marked remember, whether their memory included perceptual, thought, emotion, or context details.

EXPERIMENT 1

It is predicted that the findings from Experiment 1 will show that biographical information is affected similarly by typicality as other types of scripted information due to the activation of the cultural life script. Participants will have significantly greater correct recognition for presented atypical, as opposed to presented typical, life-script events as well as significantly greater correct rejection for unpresented atypical, than unpresented typical, life-script events. Additionally, for reports of the phenomenological experience of remembering typical versus atypical life-script events, it is predicted that significantly more remember judgments will be reported for atypical, rather than typical items, while conversely, significantly more know and infer judgments will be made for

typical, than atypical, events. In addition, more memory details will be reported for atypical than typical events.

METHOD

PARTICIPANTS

Sixty-four undergraduate students from a large Midwestern university participated in the experiment in exchange for extra credit in psychology courses. The sample consisted of 27 males (42.2%) and 37 females (57.8%) ranging in age from 18 to 27 (M = 19.89, SD = 1.77).

MATERIALS

The narratives used consisted of the events that occurred in periods of the characters' lives. The events were presented in chronological order. The characters were a male named Steve and a female named Shelley. Half of the participants heard stories in which Steve was young and Shelley was old, while the other half heard stories in which Shelly was young and Steve was old. The events in the life of the young character occurred from birth to young adulthood, and those for the old character occurred from age 45 to age 75. The study was developed with a fully counterbalanced design. Eight versions of original narratives were created in order to account for the counterbalancing of three two-level factors: Item typicality (Typical, Atypical), item presentation (Presented, Unpresented), and character age and gender (Young Male & Old Female, Young Female & Old Male). Sixteen recognition tests were created to account for the counterbalancing of four two-level factors: the above- mentioned factors of typicality,

presentation, and character age and gender, as well as the counterbalancing of delay (10 min, 24 hr). The counterbalancing of delay was accomplished by giving half of the participants the recognition tests in one order, and the other half in the opposite order. Item typicality was counterbalanced by presenting every item in both young and old narratives, thereby using every item as typical and atypical. The counterbalancing of item presentation was accomplished by making items presented to half the participants the unpresented items in the recognition tests of the other half of the participants.

Manipulation Check

The critical items were chosen from items rated on their typicality of occurring to either a young or old person. Items used were taken from the list of important life events generated by participants in Berntsen and Rubin (2004, study 2). However, in some cases, events were rephrased to be more specific, such as changing, "serious disease" to "got cancer," or "parent's death" to "father's death." Table 1 lists the critical events and their level of typicality as a function of age of occurrence. As a manipulation check, 40 participants not in the experiment reported below rated items on a 7-point Likert scale with 1 being very atypical, and 7 being very typical. Half of the items presented were predicted to be Typical Young/Atypical Old, and half predicted to be Typical Old/Atypical Young. Subjects were randomly assigned to either a group judging the typicality of the events for a young person, or one judging the typicality of the events for an old person. To examine the appropriateness of the items, a within-groups analysis of variance (ANOVA) was performed on the judgment for young and judgment for old groups separately. For the judgment for young group, there was a significant difference in the rating of expected young (M = 4.91, SD = .64) and expected old (M = 2.53, SD

=.69) items, $F(1, 19) = 128.29$, $MSE = .44$, $p < .05$, in which expected young items were rated significantly more typical for a young person than an old person . For the judgment

Table 1.
Life Event Critical Items by Age and Typicality

Event
Young typical/Old atypical
Get first job
Earn first money
Make first friend
Graduate high school
Go to school
Leave parents' home
First sexual experience
Go to college
Old typical/Young atypical
Have grandchildren
Significant other dies
Has major surgery
Is retired
Sibling dies
Develop serious/life threatening disease
Parent dies
Empty nest

for old group, there was a significant difference in the typicality rating of expected old ($M = 5.78$, $SD = .48$) and expected young ($M = 2.14$, $SD = .56$) items, $F(1,19) = 423.52$, $MSE = .31$, $p < .05$, in which expected old items were rated significantly more typical for an old person than a young person.

Design

The experiment was implemented in a 2(Typicality: Typical, Atypical) X 2(Presentation: Presented, Not Presented) X 2(Delay Interval: 10 min, 24 hr) X 2(Age Group: Young, Old) within-subjects design. The recognition tests contained eight

questions in each delay condition, 16 per participant. All questions adhered to a similar general format such as, "was it stated or unstated that Steve fell in love for the first time?" Follow-up questions followed the format of, "did you remember, know or infer that it was stated that Steve fell in love for the first time?" and "was your memory that Steve fell in love for the first time accompanied by perceptual, thought, emotion, or context details?" Question order was randomized for all participants in both delay conditions. The experiment was conducted on personal computers with Microsoft Windows operating systems using Media Lab software.

PROCEDURE

Participants sat individually at computers with up to three participants per room. Participants listened to the narratives on headphones. Upon completion of the narrative presentation, participants completed a distracter task of word search puzzles, after which they were informed that they would be tested for their memory of items presented in the narratives. They were read test instructions by the experimenter then took the recognition test. For each event referenced, the participants were asked three separate questions. First participants were asked if the event was stated or unstated in the narratives. If they chose stated, they were next asked whether they remembered, knew, or inferred that it was stated in the narrative. Finally, if they indicated remember, they were asked to indicate the presence of perception, thought, emotion, or context details with their memory. Block randomization was used to randomize the order of the events being asked about, i.e., the order of the series of three questions was constant, but the order of events they were in reference to was randomized. After completion of the 8 item 10 minute delay condition test, participants returned at the same time the next day to

compete the 8 item 24 hour delay condition test. The format of the recognition tests was identical in both delay conditions. After completing the 24-hour delay condition, participants were debriefed.

RESULTS

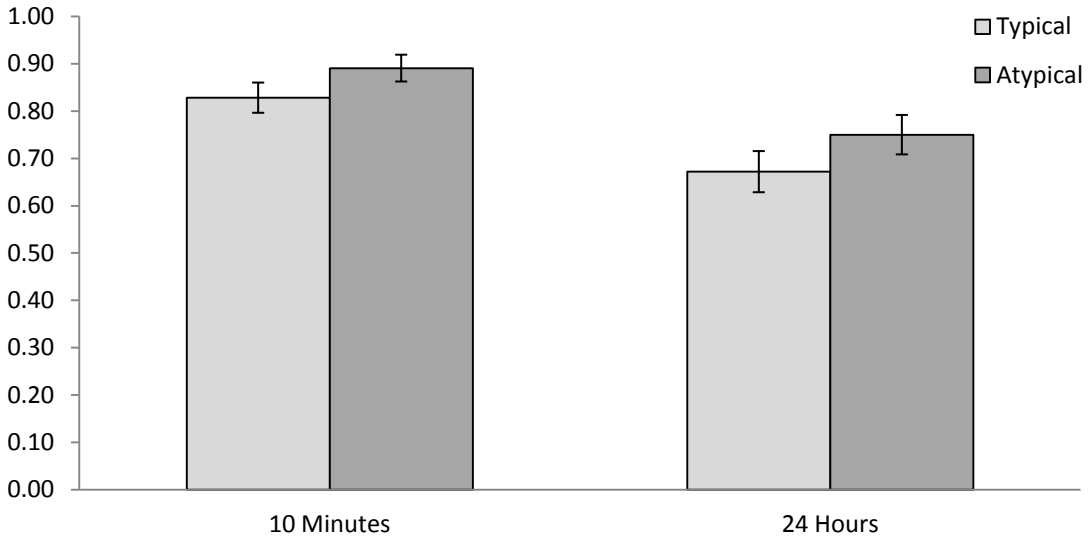
The main goal of the current research is to determine if other findings concerning the effect of item typicality on memory for scripted information will be replicated using life-script information. To that end, several key issues will be examined. First, are the typicality effect's two main predictions satisfied? Is there superior correct recognition of age-atypical instead of age-typical, items, and superior correct rejection of atypical, rather than typical, items? Secondly, the effects of item typicality and delay on the subjective experience of remembering scripted information will be investigated. It is predicted that the subjective experience of remembering life-script events as a function of typicality will be similar to findings previously obtained with other types of scripted information. To examine this question, the reporting of remember, know, and infer judgments as a function of item typicality and delay will be analyzed as well as the reporting of memory details as a function of typicality and delay. Finally, analyses will be conducted to examine the reporting of remember, know, and infer judgments, as well as memory details, as a function of whether memories are true memories or false memories.

Correct and false recognition. The effects of item typicality, delay interval, and age on correct recognition of presented items were examined with a 2(Typicality: Typical, Atypical) X 2(Delay Interval: 10 min, 24 hr) X 2(Age Group: Young, Old) within-subjects, repeated measures analysis of variance (ANOVA) (presented and

unpresented items are examined separately, so the factor of presentation is not included in these analyses).

Figure 1 depicts mean correct and false recognition by typicality and delay interval. There was a significant main effect of typicality, $F(1, 63) = 4.37$, $MSE = .15$, $p < .05$. Significantly more atypical items ($M = .82$, $SD = .19$) were correctly recognized than typical items ($M = .75$, $SD = .21$), as would be expected with the typicality effect.

Figure 1. Mean correct recognition as a function of typicality and delay interval

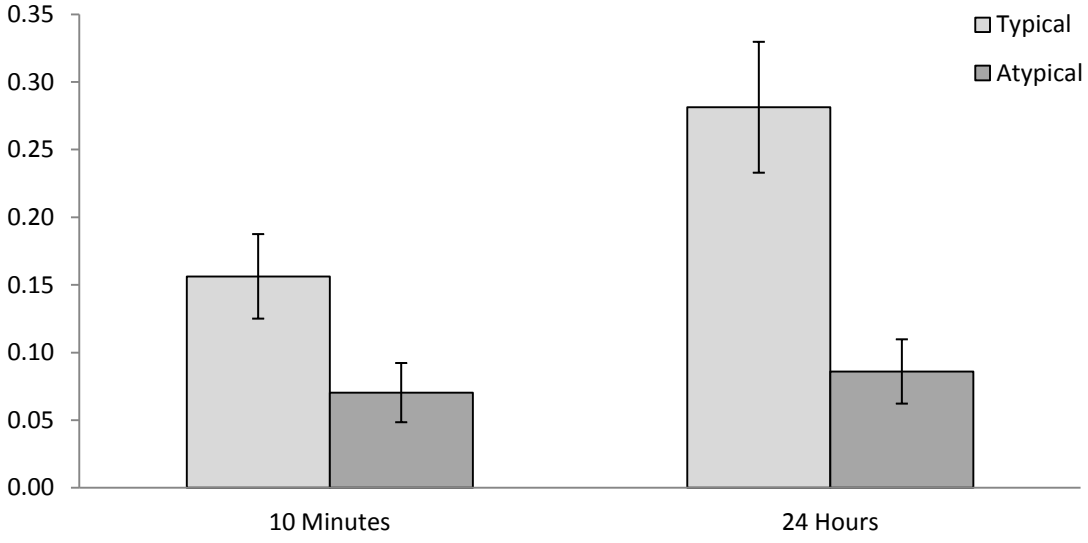


There was also a significant main effect of delay interval, $F(1, 63) = 11.90$, $MSE = .24$, $p < .005$. Significantly more items were correctly recognized at the 10 minute ($M = .86$, $SD = .17$), than at the 24 hour ($M = .71$, $SD = .27$), delay interval. Contrary to predictions, the main effect of age group was also significant, $F(1, 63) = 9.00$, $MSE = .17$, $p < .005$. Significantly more items were recognized when presented for the young ($M = .84$, $SD = .20$), as opposed to the old ($M = .73$, $SD = .22$), character. The two-way interactions of typicality and delay, typicality and age group, delay and age group, and

the three-way interaction of typicality, delay, and age group, were all non-significant, $p > .05$.

Next, the same analysis is conducted to examine the effects of item typicality, delay interval, and age group of the character the item was presented for on false recognition of unpresented items. The 2(Typicality: Typical, Atypical) X 2(Delay Interval: 10 min, 24 hr) X 2(Age Group: Young, Old) within-subjects, repeated measures ANOVA revealed that were several significant effects. Figure 2 shows the mean false recognition as a function of typicality and delay interval. First, there was a significant main effect of typicality, $F(1, 63) = 16.84$, $MSE = .15$, $p < .001$. Significantly more typical ($M = .22$, $SD = .27$), than atypical ($M = .08$, $SD = .15$), items were falsely recognized, meeting the expectations of the typicality effect. The main effect of delay

Figure 2. Mean false recognition as a function of typicality and delay interval



was also significant, $F(1, 63) = 6.80$, $MSE = .09$, $p < .05$, demonstrating that significantly more unpresented items were falsely recognized at the 24 hour delay interval ($M = .18$,

SD = .22), than at the 10 minute delay interval (*M* = .11, *SD* = .17). The main effect of age group was not significant ($p > .05$), fulfilling the hypothesis that age group did not have an effect on false recognition. The two-way interaction of typicality and delay approached significance, $F(1, 63) = 3.94$, *MSE* = .10, $p = .05$. Follow-up pairwise t-tests reveal that three of the simple effects were significant. There was a significant simple effect of delay interval for typical items, $t(63) = 2.65$, $p < .05$, in which significantly more typical unpresented items were falsely recognized at the 24 hour delay interval (*M* = .28, *SD* = .39) than at the 10 minute delay interval (*M* = .16, *SD* = .25). There was also a simple effect of item typicality for unpresented items falsely recognized at the 10 minute delay interval, $t(63) = 2.64$, $p < .05$. Significantly more typical (*M* = .16, *SD* = .25), than atypical (*M* = .07, *SD* = .18), unpresented items were falsely recognized, conforming to the expectations of the typicality effect. Finally, there was a significant simple effect of item typicality on the falsely recognition of unpresented items at the 24 hour delay interval, $t(63) = 3.69$, $p < .001$. Significantly more typical (*M* = .28, *SD* = .39), than atypical (*M* = .09, *SD* = .19), items were falsely recognized, as would be expected in the typicality effect. The two way interaction of typicality by age group was significant, $F(1, 63) = 12.06$, *MSE* = .09, $p < .005$. Follow-up pairwise t-tests show that there was a significant simple effect of item typicality for events presented for the young character, $t(63) = 4.71$, $p < .001$. Significantly more typical (*M* = .27, *SD* = .38) unpresented items were falsely recognized than atypical (*M* = .04, *SD* = .14) items, conforming to the expectations of the typicality effect. There was a significant simple effect of age group for typical items, $t(63) = 2.58$, $p < .05$. In an unexpected finding, significantly more typical items were falsely recognized when presented for the young (*M* = .27, *SD* = .38),

as opposed to the old (M = .16, SD = .24), character. Finally, there was also a significant simple effect of age group on the false recognition of unpresented atypical items, $t(63)$ = 2.31, $p < .05$. Significantly more unpresented atypical items were falsely recognized for the old (M = .12, SD = .25), than the young (M = .04, SD = .14), character, contrary to the prediction that age group of the character would have no effect on false recognition..

Remember, know, and infer judgments. In addition to testing for the typicality effect using stated versus unstated questions in the recognition test, the effect of typicality on participants' tendencies to make remember, know, and infer judgments was also tested. Previous findings have demonstrated the relation of item script typicality to the reporting of remember, know, and infer judgments (Lampinen et al., 2000). To assess the effects of typicality, delay interval, and age of the character for which the item was presented on participants remember judgments, a 2(Typicality: Typical, Atypical) X 2(Delay Interval: 10 min, 24 hr) X 2(Age Group: Young, Old) within-groups, repeated measures factorial ANOVA was performed on presented items. Remember judgments are a high-threshold judgment, indicating the presence of details for the actual encoding experience. Therefore, it is predicted that more remember judgments will be made for atypical than typical items because of the extra processing involved in their encoding beyond that occurring for typical items, which are already inferred as part of the activated, underlying script. There was a significant main effect of typicality, $F(1, 63)$ = 29.31, MSE = .123, $p < .001$. In accord with the expectations of the typicality effect, significantly more remember judgments were made for atypical (M = .67, SD = .29), than typical (M = .50, SD = .26), items. There was also a significant main effect of delay, $F(1, 63) = 8.17$, MSE = .36, $p < .01$. Significantly more items were remembered at the 10

minute (*M* = .66, *SD* = .32), than the 24 hour (*M* = .51, *SD* = .33), delay interval. The third main effect, that for age of the character, was also significant, $F(1, 63) = 5.27$, *MSE* = .196, $p < .05$. Significantly more remember judgments were made for items presented for the young (*M* = .63, *SD* = .30), than for the old (*M* = .54, *SD* = .29), character, contrary to the expectation that age of the character would not have an effect. None of the two-way interactions, or the three-way interaction were significant at the $p < .05$ level.

The same analysis was next performed for participants know judgments. Know judgments are indicative of a more subjective sense of knowing, rather than possessing explicit memory traces for actual details of the encoding experience. Therefore, it is expected that more know judgments would be made for typical than atypical items because of the relative lack of processing associated with the encoding of items that are already inferred by the activated script. There was a significant main effect of item typicality, $F(1, 63) = 5.61$, *MSE* = .13, $p < .05$. As would be expected with the typicality effect, significantly more know judgments were made for typical (*M* = .20, *SD* =), than atypical (*M* = .13, *SD*), items. There were no other significant effects in this analysis (all $p > .05$). One surprising aspect of this is that, contrary to the findings, one would expect more know judgments to be made as delay interval increases, reflecting the decay of explicit memory details. Finally, an analysis was conducted to examine the effect of typicality, delay interval, and age of the character on participants' infer judgments. The 2(Typicality: Typical, Atypical) X 2(Delay Interval: 10 min, 24 hr) X 2(Age Group: Young, Old) within-groups, repeated measures factorial ANOVA showed that, contrary to the expectations of the typicality effect, there was no significant main effect of

typicality. However, considering that the findings regarding remember and know judgments confirmed the expectations of the typicality effect, this finding does not indicate the lack of a typicality effect. There was, however, a significant main effect of delay, $F(1, 63) = 4.85$, $MSE = .026$, $p < .05$. As would be expected, significantly more infer judgments were made at the 24 hour delay ($M = .05$, $SD =$) than at the 10 minute delay ($M = .02$, $SD =$). The two-way interaction of typicality and age group approached significance, $F(1, 63) = 3.71$, $MSE = .03$, $p = .06$. Follow-up pairwise comparisons show that only one of the four simple effects was significant. For items presented for the young character in the narrative, significantly more infer judgments were made for typical ($M = .06$, $SD = .17$), than atypical ($M = .01$, $SD = .06$) items, $t(63) = 2.42$, $p < .05$. No other interactions were significant.

Memory details. To investigate the effects of typicality, delay, and the age of the character the item was presented for on the reporting of memory details, a 2(Typicality; Typical, Atypical) X 2 (Delay Interval: 10 min, 24 hr) X 2(Age Group: Young, Old) X 4(Detail Type: Perceptual, Thought, Emotion, Context) within-groups ANOVA was performed analyzing presented items and using data from all participants who made at least one remember response per each condition (presented/typical, presented/atypical, unpresented/typical, unpresented/atypical). There were several significant effects. First, there was a significant main effect of typicality, $F(1, 63) = 17.86$, $MSE = .10$, $p < .001$. As would be expected with the typicality effect, significantly more details were reported for atypical ($M = .32$, $SD = .17$), than typical ($M = .24$, $SD = .11$), items. There was also a significant main effect of detail type, $F(1, 63) = 3.56$, $MSE = .38$, $p < .05$. Follow-up pairwise comparisons show that there were significantly more emotion ($M = .35$, $SD =$

.21) than perception (*M* = .20, *SD* = .23) details reported, *t*(63) = 2.62, *p* < .05, significantly more context (*M* = .33, *SD* = .27) than perception details were reported, *t*(63) = 2.36, *p* < .05, and significantly more emotion than thought (*M* = .23, *SD* = .21) details were reported, *t*(63) = 2.45, *p* < .05. No other effects in the factorial ANOVA were significant at the p < .05 level.

True versus false memories. The rate at which remember judgments were made for true and false memories at either 10 minutes or 24 hrs was examined using a 2(Item Type: Hit, False Alarm) X 2(Delay Interval: 10 min, 24 hr) X 2(Age Group: Young, Old) within-groups, repeated measures factorial ANOVA. There was a significant main effect of item type, *F*(1, 63) = 259.37, *MSE* = .57, *p* < .001. Significantly more hits (*M* = 1.17, *SD* = .49) were made than false alarms (*M* = .10, *SD* = .20). The main effect of delay approached significance, *F*(1, 63) = 3.75, *MSE* = .41, *p* = .057. More remember judgments were made at 10 minutes (*M* = .69, *SD* = .33) than at 24 hours (*M* = .58, *SD* = .37). The main effect of age group was also significant, *F*(1, 63) = 8.26, *MSE* = .24, *p* < .01. Significantly more remember judgments were made for items presented for the younger (*M* = .70, *SD* = .34), as opposed to the older (*M* = .57, *SD* = .30), character. Only one of the interaction effects was significant, item type by delay, *F*(1, 63) = 11.67, *MSE* = .42, *p* < .005. Follow-up pairwise t-tests reveal that there was a significant simple effect of delay interval for hits, *t*(63) = 2.86, *p* < .01. As would be expected, significantly more hits were made at the 10 minute delay interval (*M* = 1.32, *SD* = .65) than at the 24 hour delay interval (*M* = 1.02, *SD* = .66). Conversely, significantly more false alarms were made at 24 hours (*M* = .14, *SD* = .32) than at 10 minutes (*M* = .06, *SD* = .18), as would be expected. There were also significant simple effects of item type for both delay

intervals. There were significantly more hits (M = 1.32, SD = .65) than false alarms (M = . 06, SD = .18) made at the 10 minute interval, $t(63) = 15.06$, $p < .001$, and there were significantly more hits (M = 1.02, SD = .66) than false alarms (M = .14, SD = .32) made at the 24 hour interval, $t(63) = 9.60$, $p < .001$. The 2 way interactions of item type by age group and delay by age group, as well as the three-way interaction, were not significant at the $p < .05$ convention.

Next, the effect of item type, delay, and age of the character in which the item was presented on the reporting of memory details. Therefore, a 2(Item type: Hit, False Alarm) X 2(Delay Interval: 10 min, 24 hr) X 2(Age Group: Young, Old) X 4(Detail Type: Perception, Thought, Emotion, Context) within-groups, repeated measures factorial ANOVA was performed utilizing all cases where participants had both a hit and false alarm in each delay condition. There was a significant main effect of item type, $F(1, 19) = 39.49$, MSE = .52, $p < .001$, wherein significantly more details were reported for hits (M = .41, SD = .27) than false alarms (M = .07, SD = .09). There was also a significant two way interaction of detail and item type, $F(3, 57) = 3.40$, MSE = .18, $p < .05$ Follow-up pairwise t-test show that for all detail types, more were reported for hits than for false alarms. There were significantly more perception details reported for hits (M = .30, SD =.33) than false alarms (M = 0.3, SD = .08), $t(19) = 3.69$, $p < .005$. There were significantly more thought details reported for hits (M = .31, SD = .36) than for false alarms (M = .08, SD = .14), $t(19) = 3.05$, $p < .01$. There were significantly more emotion details reported for hits (M = .58, SD = .40) than for false alarms (M = .06, SD = .11), $t(19) = 6.25$, $p < .001$. Finally, there were more context details reported for hits (M = .45, SD = .52) than for false alarms (M = .10, SD = .24), $t(19) = 3.99$, $p < .005$. There was a

significant simple effect of detail for hits in which significantly more emotion details (*M* = .58, *SD* = .40) were reported than perception details (*M* = .30, *SD* = .33), *t*(19) = 3.40, *p* < .005. There was also a significant simple effect of detail for hits in which significantly more emotion details were reported for hits than thought (*M* = .31, *SD* = .36) details, *t*(19) = 2.99, *p* < .01. No other pairwise comparisons were significant (*p* > .05). The two-way interaction of detail by delay approached significance, *F*(3, 57) = 2.56, *MSE* = .17, *p* = .06. Follow-up pairwise t-tests show that only three significant simple effects could be found. There was a significant simple effect of detail type for the 24-hour delay interval in which significantly more emotion (*M* = ..38, *SD* = .33) than perception (*M* = .10, *SD* = .17), details were reported, *t*(19) = 3.58, *p* < .005. Another significant simple effect of detail type occurred for the 24 hour delay condition in which significantly more context (*M* = .31, *SD* = .46), than perception, details were reported, *t*(19) = 2.10, *p* = .05. Finally, another simple effect of detail type for the 24 hour delay interval was found in which significantly more emotion details were reported than thought (*M* = .20, *SD* = .29) details, *t*(19) = 2.21, *p* < .05. No other effects in the factorial ANOVA were significant.

DISCUSSION

Overall, the findings demonstrate that with regard to correct and false recognition, as well as effects on the phenomenological experience of remembering, the expectations of the typicality effect were observed,. The results suggest that, as with other forms of scripted information, the typicality effect also occurs with biographical information, and that they are a script similar to those previously used to test the typicality effect. Life events that were not age appropriate, therefore constituting violations in the cultural life script, were correctly recognized significantly better than those that were script typical.

According to the attention elaboration and script pointer+tag hypotheses, these events attracted greater attention resulting in increased depth of processing and were stored explicitly as functionally separate from the cultural life script, respectively. Life events that were typical on the other hand were recognized falsely significantly more than those that were atypical because, according to the script pointer + tag hypothesis, they are part of the activated script, and therefore indistinguishable from those events explicitly stated in the source material.

In accord with the expectations of the typicality effect for remember, know and infer judgments based on the Dynamic Memory Model (DMM), significantly more remember judgments were made for atypical, rather than typical items, and more know judgments for typical items. Additionally, significantly more memory details were reported for atypical as opposed to typical events, as would be expected. In attracting greater depth of processing from requiring additional attention to reconcile their out-of-place occurrence, age inappropriate, cultural life script violating events generate more thought details than script typical events, which do not attract those processes.

One of the goals of the analyses was to demonstrate that age of the character did not contribute to the observed effects. To that end, age of the character for which an item was presented was included as a factor in the analyses. It was expected that the null hypothesis would be supported in all cases, i.e., there are no effects of age of the character. Surprisingly, this was not the case in some instances, such as correct recognition, remember judgments, and hits versus false alarms. With regard to correct recognition, significantly more items were correctly recognized for items presented for the young, than for the old, character. In other cases, there was no significant main effect

of age group but there were significant two-way interactions involving age group, such as with the interaction of item typical and age group on infer judgments. In several of the cases, the follow-up pairwise comparisons support the expectations of the typicality effect and involved examples where for either the young or the older character, the typicality effect was observed. With regard to false recognition, the main effect of age group was not significant, but there was a significant interaction of typicality and age group. One of the follow-up comparisons conforms to the expectations of the typicality effect, that for items presented for the young character, typical items were falsely recognized significantly more than atypical items. Overall, when effects of age group were observed, they tended to demonstrate superior memory for items presented for the young, rather than the old, character. For instance, correct recognition and remember judgments were significantly higher for items presented for the younger character. One possibility is that this effect is related to the relatively young age of the sample, who are college undergraduates. It may be that participants remembered better events occurring to a character to which they could relate more. In addition to differences based on age of the character, it might also be the case that the observed effects were not the result of item typicality, but the emotional valence or importance of the events used as critical items, as these were not counterbalanced. Potentially, emotionally positive events were better remembered than emotionally negative ones, or vice versa. Similarly, it may also be the case that highly important events were remembered better than unimportant events. No ratings of importance were obtained in the pretest condition for the critical items used. As it stands, it is currently unclear as to whether the observed effects in Experiment 1 are truly a result of item typicality, or due to differential memorability of

items based on these factors. Therefore, a second experiment in which these possibilities are examined is reported.

EXPERIMENT 2

The findings from Experiment 1 demonstrated that the typicality effect, a highly robust effect that has been found to occur with scripted information, also occurs with cultural life script information. When examining recognition memory for events varying in typicality as a function of whether or not they are age appropriate, correct recognition was better for atypical than typical, events. In addition, false recognition was better for typical, than atypical, events, as would be expected by the predictions of the typicality effect. In order to add support and present convergent evidence to the findings from Experiment 1 a second experiment was conducted. The goal of Experiment 2 is to demonstrate that the observed effects in Experiment 1 are due to typicality, not confounds such as the differential memorability of events due to age at which they were presented, importance, or emotional valence. In order to eliminate any potential confound with importance, that variable was held constant. The non-scripted life events used as critical items were all rated highly important in a pretest condition. Furthermore, the results of the pretest condition demonstrate that the critical items are unscripted life events. The standard deviations for the estimated ages at which the events are expected to occur were all high compared to life script events in test of the life script (Berntsen & Rubin, 2004; Rubin et al., 2009; Janssen & Rubin, 2011). In the current experiment, participants listened to brief biographies of fictional characters in which non-scripted events (i.e., those that do not have prescribed timings of occurrence) varying in emotional valence were presented in youth and old age. It is predicted that there will be no effect of age of

the character for which items are presented and emotional valence of the items. There will be no differences in correct recognition, the conditional probabilities of making remember, know, and infer judgments, and the reporting of memory details. Null effects should be observed across all of the analyses.

METHOD

PARTICIPANTS

Sixty-four undergraduate students from a large Midwestern university participated in exchange for extra credit in psychology courses. The sample consisted of 38 (59.4%) females and 26 (40.6%) males with a mean age of 20.11 (*SD* = 1.78, range = 18 to 29).

MATERIALS

The experimental materials consisted of a script outlining the lives of two individuals, one male and one female that covered their lives from childhood to old age. The script was presented as an audio file that participants listened to on headphones. In addition to listening to the recordings, participants completed a word search puzzle (as a distracter task) and the recognition questionnaire. The entire procedure was implemented on a personal computer using Media Lab software. The order in which the character's stories were presented was counterbalanced, so that 50% of participants heard them in one order and 50% heard them in the other order. The study used 16 critical items, all of which were unscripted life events. As opposed to life script events, which have strongly agreed upon timings, unscripted life events are ones that do not have agreed upon timings. The lack of agreement on the timings of the critical items was established in the

pretest condition using the same measure of agreement used in script generations procedures (Berntsen & Rubin, 2004; Rubin et al., 2009; Janssen & Rubin, 2011). The high standard deviations for age estimates demonstrate the lack of agreement on the timings of the unscripted life events used as critical items. Of these 16 unscripted events, eight were emotionally positive and eight were emotionally negative. A counterbalancing scheme was utilized to so that each item presented, unpresented, presented in youth, and presented in old age. In addition, half of the participants received the narrative with the male character first and half received the narrative with the female character first. In total, 16 versions of the script were used. Participants always heard eight items presented in the narratives, and were subsequently tested for their recognition of all 16 of the critical items in study in the recognition test.

Manipulation Check

Study 2 tests to make sure that no differences in the recognition of unscripted life events occurs as a function of emotional valence and age of the character the item is presented for. To that end, a pretest condition was run to obtain unscripted life events for the critical items. Unscripted life events are those whose timings of occurrence are poorly agreed upon as demonstrated by high standard deviations for their age estimates. Studies such as those by Berntsen and Rubin (2004), Erdoğan et al. (2008), Rubin et al., (2009), and Janssen and Rubin (2011) employed script generation procedures in which participants nominated the seven events most likely to happen in a hypothetical person's life to test the presence of a shared script. For the present study, participants provide the same ratings as participants in those previous studies, but instead of generating seven items on their own, they provided ratings on specific life events. From those events,

those with high standard deviations for their age estimates, which could reasonably be fit into the biography of a fictional character, were used as critical items. Ratings of emotional valence were made on a 7-point scale (-3 = very negative, 0 = neither, +3 = very positive). Events rated -1 through -3 were classified as negative and event rated 1 through 3 were classified as positive. Emotionally positive events with high standard deviations for their age estimates chosen for critical items were "settle on a career," "go on a trip," "go to a wedding," "move," "get a promotion," "have a major accomplishment," "get a raise," and "have a life changing experience." Emotionally negative events with high standard deviations for their age estimates chosen for critical items were "car accident," "divorce," "lose one's job," "miss a major opportunity," "end a friendship," "have a big fight," "have legal problems," and "problems at work." A one-way analysis of variance (ANOVA) showed that there was no difference in the expected age of occurrence for emotionally positive (M = 22.59, SD = 5.68) and negative (M = 23.80, SD = 7.15) events, $p < .05$. The mean standard deviation for the age estimates of these items was 8.03, which indicates that, on average, the timings of occurrence for these items are not strongly agreed upon. A one-way ANOVA shows that there is no significant difference in the scriptedness (standard deviations of the age estimates) of items between the emotionally positive (M = 8.08, SD = 1.72) and emotionally negative (M = 7.98, SD = 3.03) events, $F(1, 14) = .01$, MSE = 6.06, $p = .93$, $p = .05$, demonstrating that the critical items from each group are equally unscripted.

PROCEDURE

Participants were told that they would be participating in an impression formation experiment and that they would listen to stories about people's lives then subsequently

answer questions about the material to which they listened. Participants were seated individually at personal computers in rooms that could accommodate up to three people, so one to three people completed the procedure at a time. Participants began the study by completing a brief demographics questionnaire in which they reported their age and gender. Next, they were presented the instructions for the audio portion. Participants were instructed to put on their headphones and the narratives were played. After the narratives ended, the instructions on the computer screen indicated that the participants would engage in a timed task. A computer-based word search puzzle was then presented which required participants to find as many hidden words as possible. The word search task lasted 15 minutes, at the end of which the recognition test instructions were presented. After reading the instructions, participants completed the recognition test. After completing the recognition test, the procedure was over.

RESULTS

Correct recognition. As the findings from Study 1 demonstrated that the typicality effect occurred for cultural life script information, the goal of the current study is to demonstrate that those effects were not due to confounds with emotion and age of the character. To that end, it is expected that the present experiment will demonstrate that the typicality effect does not occur with unscripted events varying in emotional valence and presented occurring to characters of different ages. To examines this, a series of within groups, repeated measures analyses of variance (ANOVA) were conducted using the factors of Age of Character: (Young, Old) and Emotional Valence (Positive, Negative) to examine correct recognition, the reporting of remember, know, and infer judgments, memory details, and hits versus false alarms. It is expected that for all of

these analyses, the null hypothesis will not be rejected, i.e., there will be no effects of age of the character or emotional valence of the event. Note that age can only be assigned to presented items based on their placement in the narrative. Likewise, it is not possible to include age of the character in examinations of hits versus false alarms. Therefore, it is not possible to test false recognition of unpresented items with age as a factor.

First, a 2(Age of Character: Young, Old) X 2(Emotional Valence: Positive, Negative) within-groups, repeated measures factorial ANOVA was conducted to examine correct recognition of presented items. As expected, there was no significant main effect of emotion, $F(1, 63) = .73$, $MSE = .26$, $p = .40$, observed power = .13. In addition, as expected, there was no significant main effect of age of the character, $F(1, 63) = .69$, $MSE = .28$, $p = .41$, observed power = .13. However, an unexpected finding was observed in that there was a significant two way interaction of emotion and age group, $F(1, 63) = 10.05$, $MSE = .24$, $p < .005$. Follow-up pairwise t-tests reveal that there was a significant simple effect of emotion for items presented for the old character, $t(63) = 2.65$, $p < .05$. Significantly more positive ($M = 1.75$, $SD = .47$) items were correctly recognized than negative ones ($M = 1.50$, $SD = .64$) when presented for the older character. There was also a significant simple effect of age for negative items, $t(63) = 2.65$, $p < .05$. Significantly more negative items were correctly recognized when presented for the young ($M = 1.75$, $SD = .47$), as opposed to the old ($M = 1.50$, $SD = .64$), character.

Remember, know, and infer judgments. Next, the effects of emotional valence of items and the age of the character on participants' tendencies to make remember, know, and infer judgments is examined. First, the 2(Age of Character: Young, Old) X

2(Emotional Valence: Positive, Negative) within-groups, repeated measures factorial ANOVA was conducted to examine remember judgments. As expected, neither the main effect of emotion, $F(1, 63) = .16$, $MSE = .39$, $p = .69$, observed power = .07, nor the main effect of age, $F(1, 63) = .32$, $MSE = .43$, $p = .57$, observed power = .09, were significant. Similar to what was observed with correct recognition, there was a significant two way interaction of emotion and age of the character, $F(1, 63) = 4.29$, $MSE = .36$, $p < .05$. However, none of the pairwise follow-up t-tests were significant. The same analysis was next conducted to examine know judgments. Neither the main effects of emotion, $F(1, 63) = .90$, $MSE = .16$, $p = .35$, observed power = .15, nor age of the character, $F(1, 63) = .09$, $MSE = .17$, $p = .77$, observed power = .06, were statistically significant, as was the two-way interaction of emotion and age of the character, $F(1, 63) = 1.47$, $MSE = .17$, p = .23, observed power = .22. A similar pattern was observed for participants infer judgments. The 2(Age of Character: Young, Old) X 2(Emotional Valence: Positive, Negative) within-groups, repeated measures factorial ANOVA showed that there was no significant main effect of emotion, $F(1, 63) = 2.32$, $MSE = .04$, $p = .13$, observed power = .32, no significant main effect of age of the character, $F(1, 63) = .60$, $MSE = .06$, $p = .44$, observed power = .12, and no significant two way interaction of emotion and age of the character, $F(1, 63) = .82$, $MSE = .04$, $p = .370$, observed power = .14.

Memory details. To investigate the effects of emotion and age of the character on the reporting of memory details, a 2(Emotion: Positive, Young) X 2 (Character Age: Young, Old) X 4(Detail Type: Perceptual, Thought, Emotion, Context) within-groups ANOVA was performed analyzing presented items and using data from all participants who made at least one remember response per each condition (positive/young,

negative/young, positive/old, and negative/old). As expected, the main effects of emotion, $F(1, 12) = 2.51$, $MSE = .07$, $p = .14$, observed power = .31, and age of the character, $F(1, 12) = .19$, $MSE = .10$, $p = .67$, observed power = .07, were not significant. The main effect of detail was significant, however, $F(3, 26) = 53.97$, $MSE = .48$, $p < .001$. Follow-up pairwise t-tests show that there was significantly more perceptual details reported than all other detail types (thought, emotion, and context). Examples of perceptual details presented to participants in the instructions include remembering the intonation of the speaker's voice, remembering the loudness or softness of the speaker's voice, remembering that the speaker mispronounced something, or hearing the statement again in one's mind. Significantly more perceptual ($M = 1.63$, $SD = .28$) details were reported than thought details ($M = .29$, $SD = .32$), $t(12) = 10.49$, $p < .001$, emotion details ($M = .17$, $SD = .24$), $t(12) = 13.88$, $p < .001$, and contextual details ($M = .21$, $SD = .50$). No other simple effects were significant in the follow-up pairwise comparisons. There were no other significant effects in the factorial ANOVA. However, the two-way interaction of emotion and detail approached significance, $F(3, 36) = 2.71$, $MSE = .22$, $p = .06$. Follow-up pairwise comparisons reveal that all significant simple effects were instances of significantly more perceptual details being reported than other detail types, mirroring the main effect of details. For events that were emotionally positive, significantly more perceptual ($M = 1.54$, $SD = .38$) were reported than thought details ($M = .39$, $SD = .42$), $t(12) = 6.65$, $p < .001$, significantly more perceptual details were reported than emotion details ($M = .04$, $SD = .14$), $t(12) = 11.85$, $p < .001$, and contextual details ($M = .23$, $SD = .48$), $t(12) = 6.28$, $p < .001$. For events that were emotionally positive, significantly more perceptual ($M = 1.73$, $SD = .33$) than thought ($M = .19$, $SD =$

.33) details, $t(12) = 9.95$, $p < .001$, emotion ($M = .31$, $SD = .48$) details , $t(12) = 8.97$, $p < .001$, and contextual ($M = .19$, $SD = .33$) details were reported, $t(12) = 9.34$, $p < .001$. No other simple effects in the follow-up t-tests were significant at the $p < .05$ level.

DISCUSSION

Overall, the findings of Experiment 2 are mixed. There were no significant main effects of age and emotion, as was predicted. However, an unexpected finding was the occurrence of a significant interaction effect of correct recognition between age and emotion. Follow-up analyses revealed that correct recognition for emotionally negative events presented in youth was significantly better than for those presented in old age, and that correct recognition was significantly better for emotionally positive events presented in old age than for emotionally negative events. There are potentially two interpretations of these findings. One is that they support the cultural life script account in that cultural life scripts, which tend to cluster emotionally positive events in adolescence and young adulthood and place emotionally negative events after age 30 (Janssen & Rubin, 2011), are being activated and the occurrence of emotionally negative events in youth or positive events in old age registered as script violations, thus making them more memorable. The other is that this type of violation does not require a life script entailing prescribed slots and timings for specific events. Instead, the effect could be driven by a general impression of the tendency for events of one emotional valence to be more closely associated with one lifetime period than another, i.e., emotionally positive events with youth and emotionally negative events with old age. However, this general impression could be related to life script knowledge.

GENERAL DISCUSSION

A substantial body of research has demonstrated that the typicality effect occurs with memory for scripted information. Ostensibly, the typicality effect should be elicited with all forms of script-based information. One particular form of scripted information, life-scripts—those delineating the normative timing and order for the occurrence of life events—have come into prominence recently because evidence shows they provide a parsimonious and well-supported account of the reminiscence bump in distributions of recalled emotional autobiographical memories. However, as it stands, several alternative accounts of the reminiscence effect have merit, such as the narrative/identity account (Bluck & Habermas, 2000; Conway & Pleydell-Pearce, 2000) and cognitive account (Rubin, Rahhal, & Poon, 1998). In this account narrative identity account, memories from adolescence have a privileged status because they occur during a time in which one develops a stable sense of identity. The cognitive account (Rubin, Rahhal, & Poon, 1998) attributed the reminiscence effect to the retention of memories for the positive events of adolescence and young adulthood that benefit from the stable period that follows them. During this stable period, memories of positive events from adolescence are rehearsed more than normal or negative events, which are minimally, or not at all rehearsed. With these viable alternative hypotheses available, the contention is present among some that there are better accounts of the occurrence of the "bump" than that of life-scripts and one line of argument is that perhaps life-scripts do not exist at all, illustrating the need for added evidence. Support for the existence of life-scripts derived from the study of the bump in distributions of recalled emotional memories has been

obtained, but direct support for the existence of life-scripts independent of said evidence, has not, thus far.

Through two experiments, the current research attempts to provide novel evidence for the existence of life script. However, the findings only offer mild support for the premise that life scripts are a fundamentally similar form of script as other, previously tested scripts, such as those examined by Bower et al. (1979) and Graesser et al. (1979). Utilizing narratives chronicling the events of the lives of either a young person or an old person and critical items that varied in typicality as a function of their likelihood of occurring to a person of a certain age, the findings from Experiment 1 replicate previous experiments testing the typicality effect with life scripts. Participants in Experiment 1 demonstrated superior correct recognition of atypical presented items compared to typical ones, superior correct rejection of atypical unpresented items compared to typical ones, and a tendency to recognize falsely typical unpresented items more than atypical ones. In doing so, the findings fully support all of the predictions of the typicality effect (Bower, et al., 1979, Graesser et al., 1979). The Script Pointer + Tag (SP+T) hypothesis asserts that atypical information is explicitly stored as a functionally separate unit from the underlying script, of which it is not a part, whereas typical items need not be explicitly stored, because of their inclusion in the script. This results in a virtual "privileged" status for atypical information, whereby it is better recalled. As applied to a life-script, this would mean that a normally occurring event, such as high school graduation for a teenager of 17 or 18 years of age, would not elicit deep processing and would not have to be separately stored, because, as a normally occurring part of the activated script, its occurrence is inferred automatically. Alternatively, encountering the statement that

someone developed cancer in adolescence or young adulthood would not be part of the underlying script for young life, constituting a script violation, and it would be stored separately and explicitly, thus facilitating its future ease of retrieval. Similar effects could be found using a script for old age, where an event such as retirement would be typical and part of an underlying script, and an event such as falling in love for the first time would constitute a script violation.

In addition to the replication of the typicality effect, another class of evidence supporting the existence of life-scripts in memory was obtained in Experiment 1: The replication of findings regarding differences in the subjective experience of remembering scripted information as a function of item typicality and delay. The results of the current study show that participants are more likely to make remember judgments for atypical, rather than typical, life-script events, as was the case in previous studies using other types of scripted information, and that the findings regarding participants' know judgments for life-script events also replicate those previously obtained with other types of scripted information: Over all, there were significantly more know judgments made for typical, rather than atypical, events. Surprisingly, contrary to expectations, there were not significantly more infer judgments made for typical than atypical items, as has been observed in previous research. However, on the basis that both know and infer judgments represent a lack of explicit details for the encoding experience, they can reasonably be combined, in which case they are collectively made significantly more often for typical life-script events than atypical ones.

Experiment 1 also replicates findings regarding the reporting of memory details as a function of item typicality. The results show that as with other types of scripted

information, more memory details are reported more often for atypical, than typical, items. The Dynamic Memory Model (DMM) (Schank, 1982) accounts for differences in the subjective experience of remembering scripted information as a function of typicality. The DMM states that when atypical items are encountered in scripted information, they require greater processing resources to reconcile their unexpected occurrence in the activated scripts, resulting in more experientially vivid memories that entail information about the encounter with the script-violation. In fact, the results of the current study show that, in accord with the predictions of the DMM, more memory details were reported for atypical, rather than typical, items, replicating previous findings, and demonstrating further the similarities between life scripts and other scripts. Additionally, and as predicted, significantly more perceptual details were reported at the 10 minute, than at the 24 hour, interval, reflecting the expected decrease in memory traces from the actual encoding experience as retention interval increases. In addition, there were significantly more reports of all other detail types than perceptual ones after 24 hours, indicative of the decay of memory traces of the actual encoding experience represented by perceptual details over time.

In terms of the findings regarding the differential reporting of memory detail types, there was one unique consequence of the investigation of life-scripts information not found with other types of scripted information. This distinction was the inclusion of material that is of a significantly more emotional nature than that in previous script based experiments. This resulted in distinct patterns of reports of emotional details relative to prior research. Whereas previous studies utilized scripts with relatively non-emotion evoking events such as the activities of a young man named Jack as he goes though fairly

mundane daily routines (Graesser, et al., 1980, Lampinen et al., 2000), the current research employs such emotional life events as births, deaths, serious illness, etc. Moreover, these effects were frequently compounded by the script atypical placement of the events. The resulting effect was that emotion details were reported more than all other detail types—a stark contrast to the findings of Lampinen et al. (2000) in which emotion details were reported the least (p. 549). Emotion details would likely be a salient aspect of the "encounter" with an item within a script, and therefore could be stored as a trace of the encoding experience, in which case they would decay at a faster rate than inferential information, which would supplant actual memory traces as time elapses since encoding. However, there is also the potential for an emotional response to the recognition test item as well. Emotion details should more likely be reported for atypical, rather than typical, emotionally evocative events, because of the explicit processing of them at encoding, which is more common with atypical items. Additionally, more emotional details should be reported for atypical items because of their increased emotional impact, especially when they are negative, as in such cases as the occurrence of cancer in youth, which may be seen as more tragic than when occurring in old age. Conforming to this prediction, there were more emotion details reported for atypical than typical items, though this follow-up pairwise comparison was not presented because the 2-way interaction of typicality by detail was not significant at conventional $p < .05$ levels.

While the research hypotheses in Experiment 1were supported, and the typicality effect was observed, there exists some potential caveats to those findings. It may be the case that the observed effects were attributable to the confounding of typicality with the

emotional valence and importance of items. In order to address these concerns, Experiment 2 was conducted. In Experiment 2, we tested recognition memory for unscripted life events varying in emotion and presented as occurring to both old and young characters. In addition, importance was held constant, as pre-test data demonstrated a consistent tendency for participants to rate all tested life events as relatively high in importance. It was predicted that there would be no significant differences as a function of emotional valence of the items or the age of the character for which it was presented. While there was no significant main effect of emotion or character age, as predicted, there was however, a significant interaction effect of emotion and character age. Follow-up analyses revealed that, for the older character, significantly more positive items were correctly recognized than negative ones, while significantly more negative items were correctly recognized when presented for the younger, than for the older, character.

The observed pattern of superior correct recognition is similar to what one would expect to occur with the typicality effect based on life scripts. Two of the key properties of the life script are that it favors the period of adolescence to young adulthood (ages 10 to 30), and is biased towards emotionally positive events, therefore representing an idealized life. Alternatively, most negative events are expected to occur after age 30. Superior correct recognition of emotionally positive events for an older character seems to indicate an effect of atypicality that reflects the relation between emotional valence and lifetime periods in the life script. So too does superior recognition of emotionally negative items for a younger character. However, these findings occurred with *unscripted events*, for which the typicality effect is not expected to occur. That such

associations between age and emotional valence are made without prescribed event timings suggests the possibility that, instead of the typicality effect occurring based on scripts, the typicality effect occurred based these associations. Moreover, the possibility that the typicality effect occurred based on such association rather than from scripts may extend to the findings from Experiment 1 as well. Such associations may be a form of knowledge in semantic memory, possibly a schema, which associates youth with emotionally positive events and old age with emotionally negative ones. Extensive research has demonstrated that schemas provide generic representations that indicate closely related items or concepts that are its constituents (Brewer & Treyens, 1981). Ostensibly, such a schema may be derived from the life script, and result in a more abstract representation of the lifecourse. However, if the findings of Experiment 2 are due to such knowledge, this finding does not preclude the possibility that the typicality effect can occur with life scripts. For instance, additional testing might reveal that the typicality effect occurs with violations of the order of events in a procedure in which emotion is held constant.

While the findings of Experiment 1 mostly demonstrated a tendency for the typicality effect to occur, their interpretability is affected by the mixed findings of Experiment 2. Overall, the findings of the present study failed to provide clear evidence that the life script is represented in memory in the same way as other types of scripts previously examined in tests of the typicality effect. Further research is required to determine if the claims in the cultural life script account about the manner in which life scripts are represented in memory are supported, as the findings from the current research neither conclusively support, nor contradict, them.

CHAPTER 5

LIFE STORY EVENTS COMPOSE THE REMINISCENCE BUMP IN AUTOBIOGRAPHCIAL MEMORY RECALL[4]

ABSTRACT

A sample of 111 undergraduates reported 3,670 autobiographical memories occurring between the ages of 8 and 18. Participants rated their memories on qualities indicative of life-story-event status, such as emotional valence, importance to identity development, perceived control and importance. Consistent with the cultural life script and life story accounts of the reminiscence effect, the upward-sloping component of the reminiscence bump up to age 18 was evident in the distribution of positive, but not negative, emotional memories. In accordance with the expectations of the life story account, the upward-sloping component of the bump was evident for life story events, but not for non-life story events. Dissociations were clearly evident, wherein the distributions of life story events increased linearly across the examined period, peaking at age 18, whereas the distributions of non-life story events were relatively flat. Furthermore, it was shown that an event's being emotionally positive in and of itself is not sufficient to produce a reminiscence bump—the bump was only evident for memories of events that were both emotionally positive *and* met other life story event criteria. The findings support the life story account of the reminiscence effect, as described by Glück and Bluck (2007).

[4] Coleman, J. T. (2012*). Life story events compose the reminiscence bump in autobiographical memory recall*. Manuscript invited for resubmission.

INTRODUCTION

In autobiographical memory research, a primary focus is to examine what memories are most likely to be recalled in a given situation, task, or when using certain autobiographical cues. Research has examined a temporal component, wherein it can be predicted from which lifetime period certain memories mostly come, and a qualitative component, in that predictions can be made about the types of memories that will be remembered based on factors such as their emotional valence and cultural and personal significance. Interest in the temporal distribution of autobiographical recall increased after the discovery of the *reminiscence effect* by Rubin, Wetzler, and Nebes in 1986. It was previously assumed that individuals simply recalled most memories from the recent past and fewer from the remote past, a pattern characterized by a monotonically decreasing retention function. Contrary to that belief, Rubin et al. observed that there was a reminiscence effect or "bump" in the distribution of memories across the lifespan, in which individuals over age 40 recall disproportionately more memories from between ages 10 and 30 than from adjacent lifetime periods. Numerous subsequent studies over the last several decades have replicated that finding across a variety of situations, including investigations with different populations (e.g., cultures) and using various cueing techniques.

The reminiscence effect has been observed in samples from disparate cultures including Bangladesh (Conway & Haque, 1999; Conway, Wang, Hanyu, & Haque, 2005), China (Conway et al., 2005), Japan (Conway et al., 2005; Kawasaki, Janssen, & Inoue, 2011), England (Conway et al., 2005), the United States (Conway et al., 2005; Collins, Pillemer, Ivcevic, & Gooze, 2007), Denmark (Berntsen & Rubin, 2002; Rubin &

Berntsen, 2003), Austria (Glück & Bluck, 2007), Turkey (Demiray, Gülgöz, & Bluck, 2009), and the Netherlands (Janssen, Rubin, & Conway, 2011; Janssen, Rubin, & St. Jacques). The effect has been elicited using word-cue techniques (Jansari & Parkin, 1996; Conway & Haque, 1999; Janssen et al., 2011; Kawasaki et al., 2011) cues to general affective states (Berntsen & Rubin, 2002; Rubin & Berntsen, 2003; Collins et al., 2007), requests for specific memories (Conway et al., 2005), requests for individuals' most important personal memories (Glück & Bluck, 2007), and unrestricted free recall (Demiray et al., 2009). The presence of reminiscence bumps has even been found in lifespan distributions of when participants encountered their favorite books, movies, and records (Janssen, Chessa, & Murre, 2007), and for the timing of the careers of individuals' favorite football (soccer) players relative to their lives (Janssen, Rubin, & Conway, 2011). The reminiscence effect has also been observed in the distributions of recalled memories from young adults when employing a technique for removing the recency effect (Kawasaki et al., 2011). In addition to findings regarding the preponderance of memories from between adolescence and young adulthood, findings have also shown that memory for public events and names from the bump period is better than that from other lifetime periods (Belli, Schuman, & Jackson, 1997). Currently, the reminiscence effect is considered, along with childhood amnesia and the recency effect, to be one of the most robust effects in autobiographical memory (Conway & Rubin, 1993), and to constitute one of the key characteristics of the lifespan retrieval curve, which is characterized by the combination of those three effects (Conway et al., 2005). More recently, findings by Berntsen and Rubin (2002) regarding the qualities of

memories comprising the reminiscence bump have led to the development of prominent accounts of the reminiscence effect that are gaining substantial support for their claims.

Berntsen and Rubin (2002) found that a dissociation occurs in the lifespan distributions of recalled emotional memories as a function of emotional valence wherein the reminiscence effect occurs for highly positive, but not highly negative, emotional memories. These findings were replicated with similar procedures by Rubin and Berntsen (2003) and Collins et al. (2007), who examined separately the autobiographical recall of both college students and adults. Subsequently, current prominent accounts of the reminiscence effect, such as the *cultural life scripts* (Rubin & Berntsen, 2003) and the *life story* (Glück & Bluck, 2007) accounts have been developed to explain this dissociation. These complimentary accounts predict the timing across the lifespan of recalled emotional memories, based on their cultural and personal significance, respectively. As they are complementary, tests of the life story account have also replicated the findings obtained by Berntsen and Rubin (2002). In this paper, the life story account of the reminiscence effect is tested.

The current study examines the autobiographical recall of U.S. undergraduate students to determine if a dissociation is evident between the temporal distributions of life story and non-life story events using an indicators of life story event status life story event qualities not previously examined in existing tests of the life story account of reminiscence. Glück and Bluck (2007) demonstrated that when memories are identified as being for life story events based on level of perceived control, the reminiscence effect occurred for high, but not low, perceived control events, and that emotionally positive events only produced a bump when rated high on perceived control. However, perceived

control is just one quality of life story events. Life story events are also highly important to identity development. Demiray et al. (2009) demonstrated that bump memories are rated significantly more important to identity development than non-bump memories. However, they did not demonstrate either a dissociation as a function of importance to identity development or a dissociation as a function of combinations of importance to identity development and emotional valence. The current study seeks to determine if these dissociations do in fact occur for life story events when using importance to identity development as their indicator. In addition, the present study also reports the first test of the life story account conducted with a U.S. sample. Findings have demonstrated that the reminiscence effect is a highly robust effect. An important aspect of that demonstration has been showing that it does not vary cross-culturally. Prior tests of the life story account of reminiscence have only been carried out in Austria (Glück & Bluck, 2007), Turkey (Demiray et al., 2009), and Denmark (Bohn, 2010; Thomsen, Pillemer, & Ivcevic, 2011) (Thomsen, Olesen, Schnieber, Jensen, and Tønnesvang (2012) tested the life story account in a Danish sample, but that study did not test the reminiscence effect *per se*). Based on this limited body of research, the cross-cultural stability of the life story account is substantially less well supported than the cross-cultural stability of the reminiscence effect. By investigating the same lifetime period used by Collins et al. (2007) to test the cultural life scripts account of reminiscence with a college-aged sample, age 8 to 18, it is predicted that the findings obtained by Glück and Bluck will generalize to other life story event qualities, such as importance to identity development and importance as well as a novel population.

THE LIFE STORY ACCOUNT OF THE REMINISCENCE EFFECT

The life story account of the reminiscence effect (Glück & Bluck, 2007) draws upon lifespan developmental psychology and uses the idea of the life story (McAdams, 1993; 2001) as an organizational mechanism in autobiographical memory. The life story is considered to constitute the highest level of organization in autobiographical memory in a hierarchically structured autobiographical knowledge information base in which subordinate levels such as lifetime periods, general events, and event-specific knowledge are nested (Conway & Pleydell-Pearce, 2000). The life story instills coherence to the memories in one's life based on their emotional and/or motivational significance and provides temporal, thematic, and causal coherence to events that places them in context relative to other life events (Bluck & Habermas, 2000; 2001). A fourth type of coherence, the cultural concept of biography, places emphasis on significant events in the normative life and prescribes or proscribes what culturally-sanctioned life events are fit for inclusion, or what undesirable events are to be omitted from the one's life story, respectively.

Recently, several studies have found evidence in support of the life story account. Glück and Bluck (2007) conducted a test of the life story account with 650 Austrian adults in which each participant reported up to 15 events they viewed as most personally important in their life, resulting in 3,541 reported memories. The findings showed that that only emotionally positive life story events – as indicated by high ratings of perceived control -- produced a reminiscence bump, while emotionally positive memories rated low on perceived control, and all emotionally negative memories failed to produce a reminiscence effect. In addition, it was found that high-perceived-control events were

rated as being more important to one's development and that among scripted events, i.e., those commonly found in cultural life scripts, only those that were emotionally positive and high-perceived control produced a bump. All other scripted events produced a relatively flat distribution across the lifespan. The findings indicate that life story events can be reliably identified based on level of perceived control and that high-perceived control is associated with the life story event quality of importance to development, as predicted by Glück and Bluck. However, the reminiscence effect and the dissociation between distributions of life story and non-life story events was only demonstrated for events identified based on perceived control, and no other life story event qualities.

In another test of the life story account of the reminiscence effect, Demiray et al. (2009) had 72 Turkish adults report memories in an unconstrained timed task in which they had 7 minutes to report as many memories as possible from each five-year period from their lives, resulting in 6,373 reported memories. Afterwards, participants rated the novelty, distinctiveness and importance to identity development of each reported memory. The authors also identified which among the reported events were transitional events. In addition to testing the life story account, Demiray et al. were also able to test the predictions of several other existing accounts of the reminiscence effect. These included the maturational (for a review, see Berntsen & Rubin, 2002), cognitive (for a review, see Berntsen & Rubin, 2002), self-narrative (Fitzgerald, 1988; Conway & Pleydell-Pearce, 2000), and life scripts (Rubin & Bertnsen, 2003) accounts. Overall, their findings demonstrated that the reminiscence effect was replicated with a Turkish sample. Inferential tests indicated that memories occurring within the reminiscence bump were rated as significantly more important to identity development and novel than

those outside the bump were, and more first time and one-time events occurred inside the bump than outside. Inasmuch as the memories that comprised the bump in their findings are likely to be for life story, and not non-life story events, then Demiray et al.'s findings that bump memories were rated as significantly more important to identity development than out-bump memories converges with Glück and Bluck's findings. In their study, Glück and Bluck found that high perceived control events were rated as being significantly more important to one's development than low-perceived control events.

More recently, a study by Thomsen, Olesen, Schnieber, Jensen, and Tønnesvang (2012) examined the characteristics of life story memories by having new college students keep diaries of their first term. Their findings showed that event characteristics such as goal relevance, emotional intensity, importance and rehearsal contribute to the selection of life story memories. A more recent development in tests of the life story account is the focus on larger lifetime periods called *life story chapters*. Life story chapters may cover periods lasting anywhere from months to years, with longer chapters nesting multiple shorter chapters within them and the beginnings and ends of some overlapping with others. Examples may include descriptions of lifetime periods such as "When I worked at the University of *X*," "When I dated my ex-girlfriend," or "When I lived in Los Angeles." Thomsen and Berntsen (2008) examined the relationship between specific memories and life story chapters in a study in which 59 older Danish adults reported life story memories. The findings indicated that life story memories tended to be both cultural life script events *and* beginnings or endings of life story chapters. Moreover, life story chapters produced a reminiscence bump, as many of them tended to occur in young adulthood. The findings also indicated that the average length of a life

story chapter was approximately 9 years. Thomsen (2009) found that when 30 elderly Danes reported their life stories, chapters were reported more often than other components of life stories, such as specific memories, categorical memories, facts, and other components, and that the reporting of chapters more often coincided with reasoning processes than reports of specific memories. Further demonstrating the way in which life story chapters mirror specific memories in their distribution across the lifespan, it has also been shown that a dissociation exists between the distributions of life story chapter beginnings as a function of emotional valence. Thomsen et al. (2011) observed that a reminiscence bump occurs for specific events that mark the beginnings of emotionally positive chapters, while a reminiscence bump does not occur for memories marking the beginnings of emotionally negative chapters.

Based on the above-mentioned research it is clear that, while still in its nascent stages, the life story account of reminiscence is slowly accumulating a body of strong evidence in its support. However, because of the somewhat limited amount of extant research on the topic, little work exists confirming prior findings and/or extending them into new situations, or to other pertinent variables. Moreover, the totality of autobiographical recall studies testing the life story account of the reminiscence effect is currently limited to a small handful conducted with Austrian (Glück & Bluck, 2007), Turkish (Demiray et al., 2009), and Danish (Bohn, 2010; Thomsen et al., 2011) samples.

THE PRESENT STUDY

In the present study, U.S. undergraduate participants were asked to report separately as many memories as possible in seven minutes from two different lifetime periods, ages 8 to 13 and 14 to 18, and the ages at which they occurred, with the only

constraint being that they report specific memories. After reporting their memories, participants provided ratings of emotional valence, perceived control, importance to identity development, and importance for each memory. Based on prior research by Glück and Bluck that the reminiscence effect occurs for life story events, but not non-life story events, when their life story event status is indicated by level of perceived control, it is predicted that in the current study, the reminiscence effect will be also only be observed with life story events. However, the recall distributions under examination will vary as a function of other life story event qualities not previously used to demonstrate the reminiscence effect. As reported above, life story events are characterized by several qualities, including importance to identity development. Glück and Bluck found that high perceived control events were rated significantly more important to one's development than low perceived control events, and Demiray et al. found that bump events which, ostensibly, are life story events, are rated significantly more important to identity development than non-bump events. The current study seeks to determine if the reminiscence bump occurs for high, but not low, importance to identity development events and if, in accord with the expectations of the life story events, emotionally positive events will not produce a bump if rated low on importance to identity development. In addition, present studies seeks to determine the extent to which importance to identity development is correlated with importance and if high, but not low, importance events form a bump as well. Demiray et al. found that bump memories were not rated as being significantly more important that non-bump memories, indicating a distinction between importance to identity development and importance. Finally, the present study also replicates Glück and Bluck's finding that the reminiscence effect occurs for high-

perceived control, but not low perceived control, events, in a novel paradigm that entails a different cueing procedure, a novel population, and the examination of a briefer lifetime period than that covered in their study. In their test of the cultural life script account of reminiscence in which they sought to determine if the dissociation between distributions of memories of opposing emotional valences would be observed, Collins et al. (2007) had undergraduates report emotional memories occurring up to age 18, demonstrating that the upward sloping component of the bump occurs for emotionally positive, but not emotionally negative, memories. Following that precedent, the present test of the life story account also asks college-aged adults to recall autobiographical memories from this lifetime period.

METHOD

PARTICIPANTS

One hundred and eleven participants completed the study, consisting of 34 (30.6%) males and 77 (69.4%) females (*M*age = 19.57, *SD* = 2.14, range = 18 to 33). Of these, 93 (83.8%) were White/Caucasian, 5 (4.5%) were Black/African American, 5 (4.5%) were Hispanic/Latino/Latina, and 8 (7.2%) were Asian.

MATERIALS

The experimental materials consisted of paper questionnaires on which memories were recorded and a computer-based questionnaire on which the reported memories were rated. The paper questionnaires included two, three-page forms labeled Form A and Form B. Form A was always to be completed first and Form B second. The lifetime period to be reported on each (8 to 13 or 14 to 18) was assigned during the procedure,

according to the counterbalancing scheme. The forms contained a table with two columns, one large, in which memories were reported, and one small, in which the ages of the corresponding memories were reported, with 60 numbered rows in which to report memories. Participants were instructed to report one memory per row. Additional pages were available in the event that any participants exceeded 60 memories per lifetime period.

The computer-based, *memory-rating questionnaire* was implemented using MediaLab software on Microsoft Windows-based personal computers. The memory rating questionnaire consisted two identical sections, one for each lifetime period (8 to 13 and 14 to 18) which included a series of five questions to be answered in relation to each memory reported in the written condition. For each memory, participants reported the age at which it occurred and provided four, 7-point Likert scale ratings. The questions were as follows:

(1) *Age*: At what age did this event occur?

(2) *Emotional Valence*: Was the event emotionally positive or negative? (-3 = *very negative*; 0 = *neither*; +3 = *very positive*)

(3) *Importance*: How important was this event? (1 = *unimportant*; 7 = *of greatest importance*)

(4) *Perceived Control*: How much control do you feel you had over this event? (1 = *none at all*; 7 = *total*)

(5) *Importance to Identity Development*: How much did this event influence who you have become in life or who you will become in life? (1 = *not at all*; 7 = *very strongly*)

PROCEDURE

Participants completed the procedure individually while seated at personal computers in a computer lab. The procedure required participants to provide both written responses and to complete a computer-based questionnaire. Before beginning the study, participants were told that they would be reporting personal memories then answering a series of questions in relation to each memory reported. However, they were not told before reporting memories what those questions would be. The memory reporting procedure was based on that used by Demiray et al. (2009), which they referred to as a modified timeline methodology. In their study, participants reported as many memories in seven minutes from each 5-year period in their lives, excluding birth to five years old. As with Demiray et al., participants in the current study were instructed to report *specific memories*. Specific memories were described as memories for *one-moment-in-time events* that should have occurred in a time span of seconds, minutes, or hours, but not longer than one day. Participants began the study by first completing a computer-based demographics questionnaire, which asked them to report their age, gender, and race/ethnicity. Next, instructions for completing the memory-reporting task were presented on the computer, which indicated which lifetime period they would be reporting from first, 8 to 13 or 14 to 18. The order in which the lifetime periods were reported from was counterbalanced so that equal numbers of participants completed each of the lifetime periods (8 to 13 or 14 to 18) first. The instructions directed them to write the lifetime period that they were reporting from on a provided blank form labeled Form A. The provided forms were lined and numbered and participants were instructed to write one memory per line. Additionally, they were told to try to describe the memory in

as few words as possible, ideally between 3 to 5 words, and that they should give each memory a brief descriptive title that would allow them to recognize to which memory they were referring, as they would have to refer back to this form later in the study. By pressing the continue button, the timed memory reporting task began and a timer appeared on the computer screen counting down from 7 minutes. An alarm sounded at the end of 7 minutes indicating that they should stop writing. An instruction screen then notified them that they would repeat this task with the other lifetime period and that they should write that lifetime period at the top of the other provided blank form, Form B. Once again, a timer counting down from 7 minutes appeared and emitted an alarm when finished, ending the memory reporting task for the second lifetime period. Next, the instructions for the memory rating condition were presented.

In the memory rating condition, participants completed a computer-based questionnaire that included five questions per each memory reported in the previous task. The questions included entering the age at which the event occurred (which was already written in the memory reporting task), and 7-point Likert scale ratings for emotional valence, importance to identity development, perceived control, and importance. A masking feature was used for age to ensure participants only entered valid ages from the correct lifetime period. The order in which the memories from the lifetime periods were rated was counterbalanced, so that equal numbers of participants rated memories from the 8 to 13 and 14 to 18 lifetime periods first. Participants were instructed to rate their memories in the order in which they were reported on their forms and that they must provide ratings for every memory reported. Furthermore, it was recommended that they check off each rated memory on their form to ensure that they did not lose track of their

place. To help participants keep track of which memory they were rating and to make sure those ratings corresponded to the correct memories, each series of five questions was numbered to indicate to which memory on their forms they corresponded. After completing the memory rating condition for the first lifetime period, an instruction screen directed participants to complete the same procedure for the other lifetime period. After all memories were rated for the second lifetime period, the experiment was complete and participants were debriefed.

RESULTS

The experiment was completed by 115 participants. However, data for 4 (3.48%) participants were excluded because the number of reported memories and rated memories did not match. The remaining 111 participants who provided complete data reported 3,670 memories, with 1,587 (43.24%) of those being reported from the lifetime period of 8 to 13 and 2,083 (56.76%) reported from the lifetime period of 14 to 18. The mean number of memories reported per participant was 33.06 (SD = 10.37, range = 15 to 68). A within-groups, repeated measures analysis of variance (ANOVA) shows that significantly more memories were reported from between the ages of 14 to 18 (M = 18.77, SD = 5.60) than from between the ages of 8 to 13 (M = 14.30, SD = 5.76), $F(1, 110) = 103.06$, MSE = 10.75, $p < .001$.

EXAMINING THE LIFE STORY ACCOUNT OF REMINISCENCE

The main goal of the present study is to replicate findings regarding the dissociation between the distributions of high and low perceived control, i.e., life story and non-life story, events, observed by Glück and Bluck and to extend it to distributions

of memories varying in respect to other life story event qualities, such as importance to identity development and importance. Table 1 shows the correlations between the life story event qualities. As would be expected because the collected variables represent

Table 1.
Correlations for Life Story Event Qualities of Memories From Between Ages 8 to 13 and 14 to 18

	Emotion	Importance	Perceived Control	ID Importance
Emotion		.10**	.43**	.15**
Importance	.18**		.06*	.68**
Perceived Control	.46**	.18**		.20**
ID Importance	.15**	.71**	.22**	

*p < .05, **p < .01
Correlations for qualities from ages 8 to 13 and 14 to 18 are presented on the top and bottom halves of the table, respectively.

qualities of life story events as described by Glück and Bluck, all of the life story event qualities are significantly positively correlated with one another, and this holds true for memories from both ages 8 to 13 and 14 to 18. Notably, importance and importance to identity development were the two most strongly correlated variables in both age groups, suggesting that to a large of extent, participants did not discriminate strongly between them. However, the fact that for both lifetime periods, importance to identity development is more strongly correlated with perceived control than importance, suggests that importance to identity development was more often associated with life story events, than importance.

In order to test the life story account of reminiscence, the distributions of memories separated by whether they do or do not meet life story event criteria are examined, as well as distributions of memories that meet some, but not all, of the criteria

necessary to produce a reminiscence bump according to the life story account of reminiscence. For all examined distributions in which life story and non-life story events were identified based on their ratings on provided variables (importance; importance to identity development; perceived control; emotional valence), high and low rated groups were created by recoding scale data into dichotomous, categorical variables. Importance to identity development, importance, and perceived control, which were rated on scales of 1 to 7, were broken into low (1 to 4) and high (5 to 7) groups, while emotion, which was rated on a scale of -3 to 3, was recoded into emotionally negative (-3 to -1), neutral (zero), and positive (+1 to +3). Comparisons of high versus low importance to identity development, importance, and perceived control, events included all emotional memories. However, comparisons involving the factor of emotional valence only compared emotionally positive and negative events. Table 2 shows the number of recalled memories based on levels of life story qualities and lifetime period.

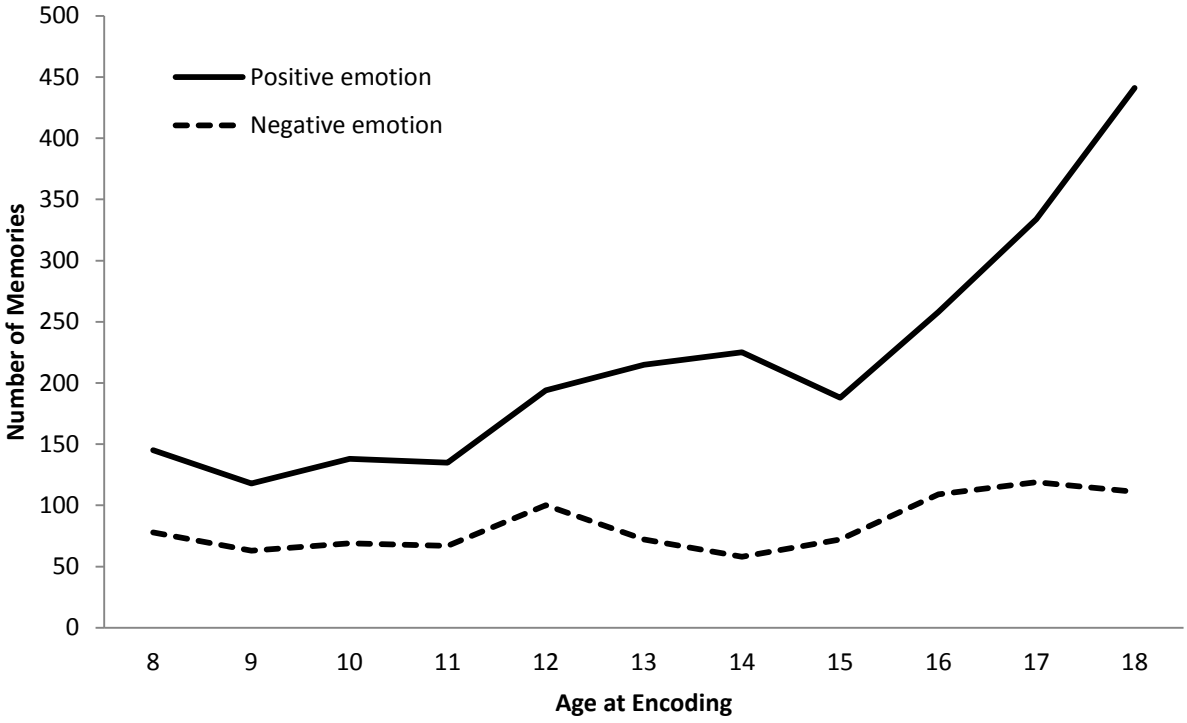
The first distributions examined are emotionally positive and negative memories. Figure 1 shows the distributions of emotionally positive and emotionally negative memories across the 8 to 18 lifetime period. Emotionally positive memories increase linearly across the examined period, peaking at age 18, which prior research suggests is the peak of the reminiscence bump. Conversely, and as expected by both the life story and cultural life scripts accounts of reminiscence, negative emotional memories are relatively flatly distributed across this period, and do not produce the upward sloping component of the reminiscence bump. The remainder of the distributions under examination test memory qualities predictive of life story event status with the prediction that: (1) the reminiscence bump occurs for memories that meet life story event criteria,

Table 2.
Number (and Percentage) of Memories by Lifetime Period for Levels of Emotional Valence, Importance, Perceived Control, and Importance to Identity Development

	Emotional Valence			Importance		Perceived Control		ID Importance	
	Negative	Neither	Positive	Low	High	Low	High	Low	High
8 to 13	449 (28.3)	193 (12.2)	945 (59.5)	730 (46.0)	857 (54.0)	921 (58.0)	666 (42.0)	933 (58.8)	654 (41.2)
14 to 18	469 (22.5)	168 (8.1)	1446 (69.4)	680 (32.6)	1403 (67.4)	895 (43.0)	1188 (57.0)	891 (42.8)	1192 (57.2)
Total	918 (25.01)	361 (9.84)	2391 (65.15)	1410 (38.42)	2260 (61.58)	1816 (49.48)	1854 (50.52)	1824 (49.70)	1846 (50.30)

but not for those that do not, and (2) being emotionally positive or rated highly on a life story event quality in and of itself does not predict a memory's inclusion in the reminiscence bump; instead, memories must be both emotionally positive *and* meet other life story event criteria to produce a bump. Figure 2 depicts the distributions of high and

Figure 1. The distributions of emotionally positive and negative memories



low importance memories and memories varying on levels of importance and valence. In accord with the predictions of the life story account, a reminiscence bump occurs for high importance, but not low importance, memories, with the latter displaying a relatively flat distribution across the lifespan. Further in accord with the predictions of the life story account, and illustrating the distinction between the life story and cultural life script

accounts, emotionally positive, high importance memories produce a reminiscence effect, while emotionally positive, low importance memories do not. Also conforming to the expectations of the life story account, all emotionally negative memories, even those that are rated high in importance, fail to produce a reminiscence effect. Similar results occur with regard to perceived control.

Figure 2. The distributions of high and low importance memories and memories varying on levels of importance and emotional valence

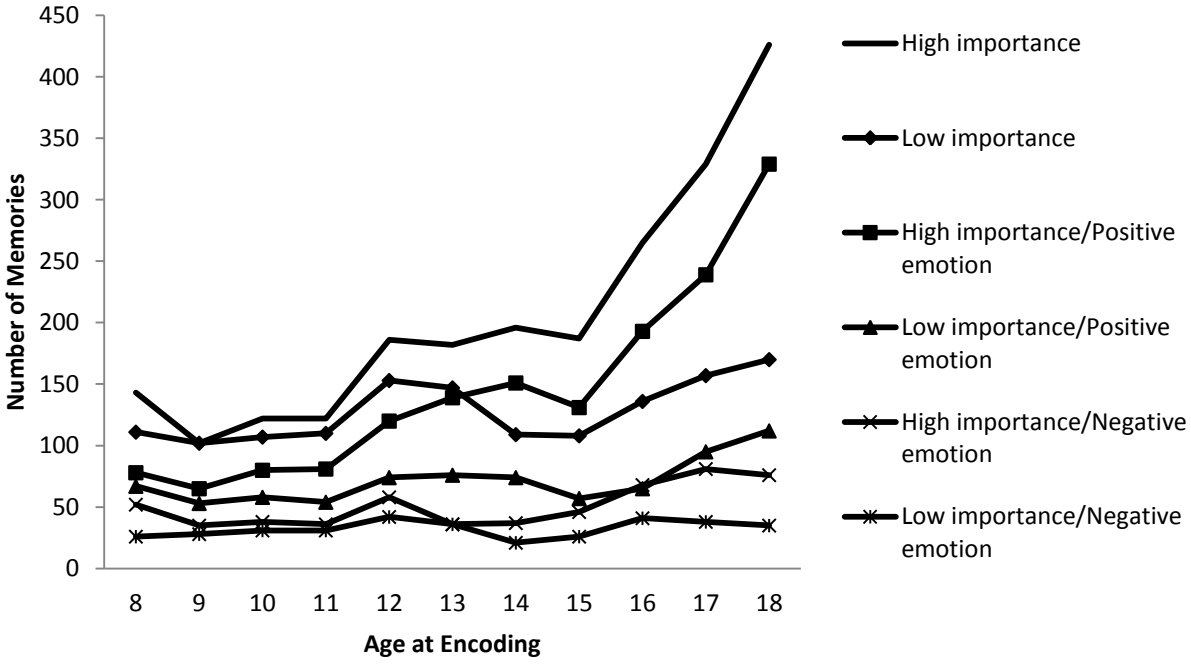
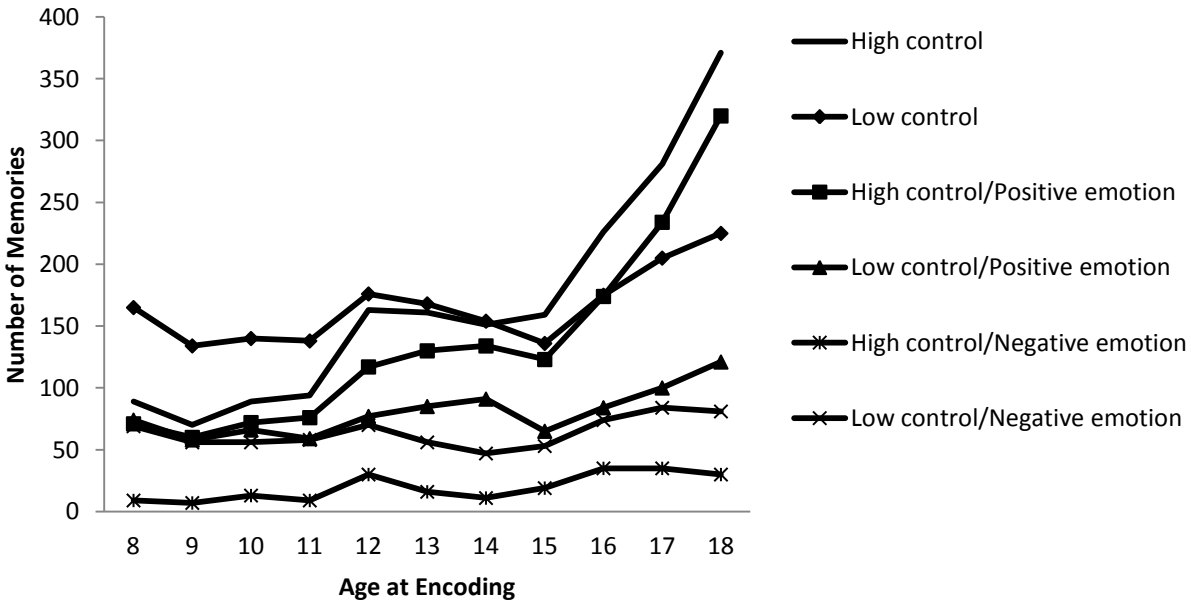


Figure 3 shows the distributions of high and low perceived control memories and memories varying on levels of perceived control and valence. Memories rated high in perceived control form a bump while those rated low in perceived control do not. Among the various combinations of perceived control and emotional valence, only emotionally positive, high-perceived control memories produce a reminiscence bump, while those that

are emotionally positive and low perceived control, emotionally negative and high-perceived control, and emotionally negative and low perceived control, do not. Lastly, the distributions of memories by levels of importance to identity development and combinations with emotional valence thereof are examined. Figure 4 shows the distributions of high and low importance to identity development memories and

Figure 3. The distributions of high and low perceived control memories and memories varying on levels of perceived control and emotional valence

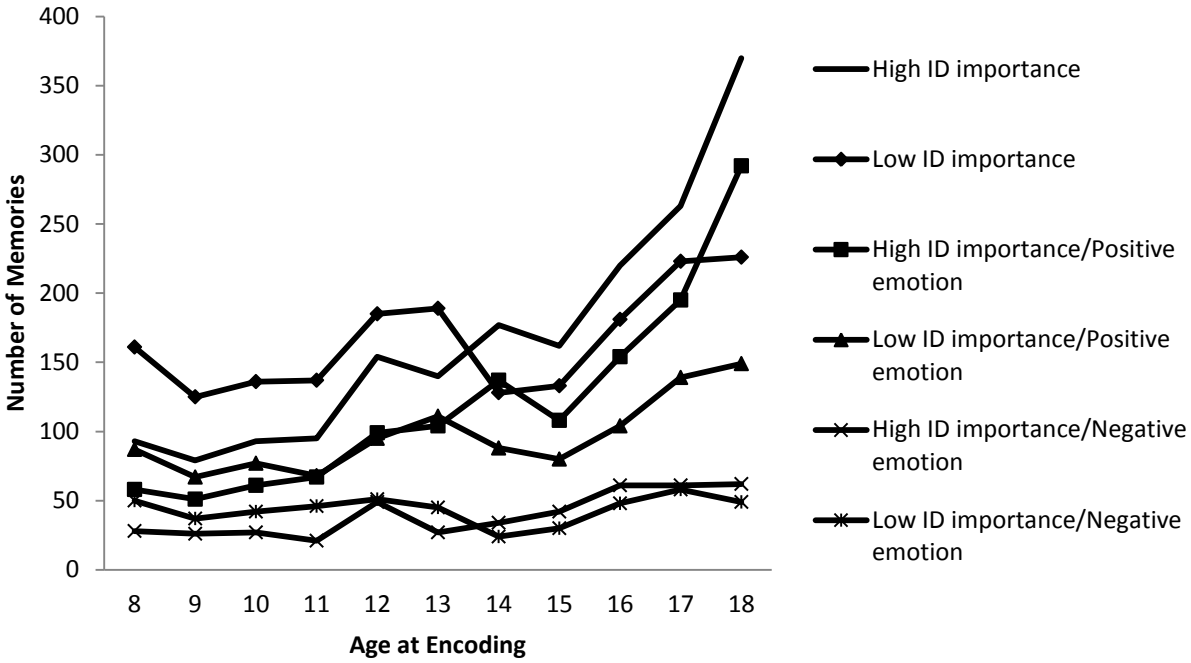


memories varying on levels of importance to identity development and valence. Conforming to the expectations of the life story account of reminiscence, a dissociation occurs wherein high importance to identity development memories form a bump, while low importance to identity development memories do not. As seen with the previous distributions, only those memories that are rated high on the life story event quality in question *and* are emotionally positive form a bump. All memories with all other

combinations of importance to identity development and valence have relatively flat distributions.

To examine further the life story account of reminiscence, mean differences in ratings of memory qualities indicating life story event status were compared between the

Figure 4. The distributions of high and low ID importance memories and memories varying on levels of ID importance and emotional valence



lifetime period of 8 to 13, an age bin not commonly part of the reminiscence bump, and the period of 14 to 18, which is commonly included in the bump range. The life story account predicts that memories from the lifetime period of 14 to 18, which prior research has shown to include several common life story events, will be rated more positive, more important, higher in perceived control, and more important to identity development, than those from the non-bump period of 8 to 13. Prior research has indicated that few, if any, life story events occur in the 8 to 13 lifetime period. To examine these effects, a

multivariate test of within-participants repeated measures (MANOVA) was conducted, revealing that memories from ages 8 to 13 were significantly different from those from ages 14 to 18, Pillai's Trace = .51, $F(4, 107) = 27.47$, $p < .001$. Memories from the bump period of 14 to 18 were rated higher than memories from between ages 8 to 13 on all life story event qualities: Memories from between ages 14 to 18 ($M = 5.17$, $SD = .83$) were rated significantly more emotionally positive than those from between ages 8 to 13 ($M = 4.75$, $SD = .92$), $F(1, 110) = 21.41$, $MSE = .46$, $p < .001$; memories from 14 to 18 ($M = 5.12$, $SD = .78$) were rated significantly more important than those from 8 to 13 ($M = 4.47$, $SD = 1.01$), $F(1, 110) = 58.88$, $MSE = .42$, $p < .001$; memories from 14 to 18 ($M = 4.57$, $SD = .83$) were rated significantly higher in perceived control than those from 8 to 13 ($M = 3.67$, $SD = .97$), $F(1, 110) = 79.67$, $MSE = .57$, $p < .001$; and memories from 14 to 18 ($M = 4.62$, $SD = .98$) were rated as significantly more important to identity development than those from 8 to 13 ($M = 3.87$, $SD = 1.17$), $F(1, 110) = 31.59$, $MSE = .50$, $p < .001$. Overall, the observed pattern fully fits the expectations of the life story account, in that memories occurring within the reminiscence bump, i.e., those from between 14 to 18, are rated significantly higher on life story event qualities than those from an out-bump period.

DISCUSSION

Four main findings support the life story account of the reminiscence effect: (1) Dissociations were evident between distributions of life story and non-life story events when they were identified based on variables not previously used to examine recall distributions in which the reminiscence bump only occurred for life story events; (2) the upward-sloping component of the bump was only evident for memories of events that

met other life story event criteria *and* were emotionally positive; (3) memories for events from the bump period were rated significantly higher on all life-story-event qualities than those from the non-bump period; (4) significant positive correlations further demonstrate that the qualities of life story events described by Glück and Bluck (2007) are in fact related. The findings that the upward- sloping component of the reminiscence bump is evident for emotionally positive, but not emotionally negative, memories, is in accord with the predictions of both the cultural life scripts (Rubin & Berntsen, 2003) and life story (Glück & Bluck, 2007) accounts of the reminiscence effect. The findings that the bump is evident for highly-important-to-identity-development, high-perceived-control, and high-importance events, but not for memories of events rated low on those qualities, supports and extends the life story account of the reminiscence effect. The life story accounts is further supported by the findings that the bump only occurs in distributions of memories for events that are both emotionally positive and meet other life story event criteria.

The results of the present study conform to what one would expect based on the autobiographical cue employed. The procedure used in the current study is based on that utilized by Demiray et al. (2009), which they refer to as a "modified version" of a variety of different, previously employed timeline procedures. Demiray et al. had their participants report as many memories as possible in 7 minutes from each five-year period from their lives, with the order of the lifetime periods randomized to avoid order effects (birth to 5 years old was omitted because of childhood amnesia). Similarly, the current study required participants to report as many memories as possible in 7 minutes from the two lifetime periods comprising the lifetime period previously examined by Collins et al.

(2007), age 8 to 18. Ostensibly, when participants are faced with procedures using autobiographical cues to just one memory or a relatively small amount of memories, they are more likely only to retrieve life story memories, resulting in a highly pronounced reminiscence bump for life story events, but also potentially leading to too few non-life story events being reported, thus precluding an examination of the kind reported here. The procedure utilized in the present study has the advantage of eliciting a large amount of memories with relatively few participants and producing a sufficient amount of non-life story events to make a reliably interpretable comparison with life story events, and, possibly even more non-life story than life-story events, as the latter are relatively rare in life. However, despite a large proportion of reported memories not meeting life story event qualities, the distributions of those memories still conformed to the expectations of the life story account by not possessing reminiscence bumps.

When considering the findings from the current study, it is important to distinguish between evidence of the reminiscence effect and evidence of the recency effect since, in the current study, the commonly observed peak of the reminiscence bump, age 18, coincides with the most recent year in the examined lifetime period. First, and of critical importance, is the observation that the upward-sloping component of the bump occurs for life story events, and not for non-life story events. If a recency effect were responsible for the current findings, then one would expect that recency would have been observed in the distributions of non-life story events. In addition, the procedure used inherently minimizes the recency effect in that it forces participants to report memories from the period of ages 8 to 13 and participants have equal opportunity (i.e., the same amount of time) to recall events from that period as from between ages 14 and 18.

Moreover, the order in which memories were reported from the two lifetime periods was counterbalanced. Because of these facts, the results of the present study indicate that the greater number of recalled memories from ages 14 to 18 is a result of the abundance of life story events occurring in that lifetime period. Additionally, this issue was address by Collins et al.

In their examination of autobiographical recall from the 8 to 18 lifetime period, Collins et al. demonstrated through a series of studies that the peak in recalled memories at age 18 for emotionally positive memories was not due to the recency effect. Instead, they concluded that it was due to the occurrence of "age-linked cultural milestones," or transitional events, which are events that tend to be instances of individuals facing developmental tasks and taking control of their lives, i.e. life story events. In their study, Collins et al. found that many of the recalled memories occurring around age 18 were related to common, transitional life events, especially the experience of starting college. Moreover, through a series of studies, they presented evidence ruling out both the recency effect and the likelihood that participants were biased toward the recollection of positive, recent events and distanced themselves from negative, self-evaluating episodes. To accomplish this, Collins et al. also examined autobiographical memories from periods lacking major transitional events in samples of college students and middle-aged adults. In one study, undergraduates reported memories from between ages 10 to 15, while in another, middle-aged adults with a mean age of approximately 46 reported memories from between ages 34 to 44. The findings from the middle-aged adults show that there is no recency effect and that there is no dissociation between the distributions of positive and negative memories, indicating the lack of a bias towards favoring recent positive

events and distancing oneself from negative events. The findings from the college-aged group reporting memories from 10 to 15 fit the same pattern. The most recalled memories do however, come from the two most recent years of the period for both emotionally positive and negative events. However, relative to their findings with the reminiscence bump, the difference in the percentage of recalled memories between the most recent and the most remote age is negligible, and does not rise to the level of a recency effect. In addition, while Collins et al. did not collect variables that provide good indicators of milestone events, the findings of the present study support their claim that the peak at age 18 is due to a preponderance of milestone events. In the present study, events that are high importance to identity development, high importance, and high-perceived control, which are characteristics of milestone events match the distributions observed by Collins et al., especially in their Study 2, in which a highly pronounced upward sloping component of the reminiscence bump was observed.

One finding from the current study that was somewhat incongruent with the findings from prior research was that, while in the current study there was a strong positive correlation between importance to identity development and importance in both lifetime periods and the bump occurred for high, but not low, importance, events, Demiray et al. found that bump memories were rated as being significantly more important that non-bump memories. This apparent discrepancy is likely due to the differences in the age range of the samples and the ranges of the lifetime periods being examined in the two studies. While participants in the current study only reported memories from two lifetime periods or five-year age bins, which also happened to be the most recent decade of their life, Demiray et al. had participants between ages 52 and 66

(*M* = 58.25, *SD* = 3.86) reporting memories from 11 five-year age bins (5 to 60). It is likely that when including seven non-bump five-year bins as opposed to one the average rating of importance for remembered events will decline substantially relative to just the single five-year bin of 8 to 13 examined in the present study. This would be especially true when they include six five-year bins after age 30, which have been shown to contain few important, transitional events (Berntsen & Rubin, 2004; Erdoğan et al., 2008; Janssen & Rubin, 2011). Moreover, as older adults gain additional perspective on life, they are more likely to have a clearer view on what constitutes a highly important event than young adults who lack a greater context for considering the events they have experienced. Therefore, the difference may be an artifact of the paradigm employed in the current study, and not an indication of contradictory findings.

The results of the current study support and extend the life story account of the reminiscence effect. They support the assertion of the life story account that in autobiographical recall, the reminiscence effect is caused by the differential sampling of life story events, i.e., emotionally positive events of personal significance that provide coherence to one's life story or narrative. These events, which often entail positively overcoming developmental tasks, provide causal coherence to the life story/narrative, are retrospectively viewed as being highly consequential, and have a strong influence on who an individual becomes in life. When these events are age-normative transitional events, which they mostly tend to be, they produce a reminiscence bump, as important transitional life events tend to cluster between the ages of 10 to 30, i.e., adolescence to young adulthood. Research indicates that there is significant overlap between cultural life script events and life story events (Thomsen & Berntsen, 2008), and life story events

that produce a reminiscence bump also tend to be cultural life script events. Evidence suggests that retrospective assessments that an event is a life story event and the influence of cultural life scripts both contribute to the occurrence of the reminiscence effect.

CHAPTER 6

SUMMARY AND CONCLUSIONS

The main goal of the current dissertation is to contribute novel tests and evidence for accounts of the reminiscence effect, thereby strengthening those accounts and, more generally, contributing to our understanding of autobiographical memory and the reminiscence effect. The four articles presented cover several issues in reminiscence effect research with two, Chapters 2 and 4, focusing on life scripts and the other two, Chapters 3 and 5, focusing on the reminiscence effect. The findings from Chapters 2 and 4 explore the cultural life script account in different ways. The test of the life script with an African American sample, like previous, similar studies with Danish (Berntsen & Rubin, 2004; Bohn, 2010), Turkish (Erdoğan et al., 2008), Dutch (Janssen & Rubin, 2011), and U.S. undergrad (Rubin et al., 2009) samples, demonstrates the cross-cultural generality of the life script, and, potentially, entails the most stringent test of its stability as it examines what is arguably the most unique population out of existing tests of the life script. The experiments in Chapter 4 directly test the typicality effect with life script information. The findings from Experiment 1 that the typicality effect occurs similarly with life scripts as it does with other types of scripted information suggest their existence and that they are in fact represented in memory. Failure to observe the typicality effect would bring into question whether life scripts are part of semantic memory as it has been reliably shown to be a consequence of script knowledge (Bower, et al., 1979, Graesser et al., 1979). In doing so, the findings support the cultural life script account, as described by Rubin and Berntsen (2003). However, that the potential exists that the effects in Experiment 1 were driven by confounds with other factors, and that mixed results were

obtained in Experiment 2, limits the conclusions that can be drawn about the findings. The unexpected findings in Experiment 2 suggest the existence of knowledge, possibly in the form of a schema, associating youth with emotionally positive affect and old age with emotionally negative affect that is independent of a life script. The implications for these unexpected results, which potentially do not preclude the existence of the life script, are discussed below.

The tests of the reminiscence effect reported in Chapters 3 and 5 unambiguously supported the predictions of the cultural life script and life story accounts. In Chapter 3, African Americans' memories of unfair treatment across the lifespan were examined to determine the presence of the reminiscence effect. In accord with the predictions of the cultural life script and life story accounts, the reminiscence effect did not occur with this emotionally negative event. Furthermore, analyses with additional distributions in which we examined separately memories of unfair treatment in various situations and attributed to various reasons also failed to display reminiscence bumps. However, it should be noted that, while the findings from Chapter 3 failed to contradict the expectations of cultural life script and life story accounts, they do not provide any definitive conclusions about the effect of minority status on the reminiscence effect and those accounts. A procedure more comparable to prior research is required to provide the best evidence of that nature.

The findings from Chapter 5 provide unequivocal support for the cultural life scripts and life story accounts. The findings demonstrated that all of the predictions of those accounts were supported. In distributions of autobiographical memories up to age 18, the upward sloping component of the reminiscence effect occurred for emotionally

positive, but not emotionally negative, events, as expected by both accounts. When examining distributions of memories rated high and low on life story event qualities such as importance, importance to identity development, and perceived control, the upward sloping component of the bump occurred only for memories rated high on those qualities. The bump did not occur for memories rated low on those qualities, as they are not life story events.

1: THE STATUS OF THE LIFE SCRIPT

The intent of the research reported in Chapters 2 and 4 was to contribute to our understanding of life scripts, and in turn, the cultural life script account of reminiscence. The findings of Chapter 2 provide clear support for the cultural life script account in the form of a replication of prior research, while the findings from Chapter 4 provide novel, albeit mixed, evidence regarding life scripts.

As previously mentioned, an important property of the life script is the manner in which it distributes emotionally positive and negative events across the lifespan and has strongly prescribed timings for the former but not the latter, as these contribute to the structuring of recall distributions. The results of Chapter 2 showed that the predictions of the cultural life script account regarding the distribution of emotionally positive events were fulfilled. Emotionally positive events, which were overwhelmingly mentioned more than negative ones, mostly occurred before age 30, with more than half of them occurring in the bump period. As such, the findings from prior tests of the life script were replicated. The results also demonstrated that, with the exception of the emotionally negative event, experiencing discrimination, the ages of occurrence for emotionally positive events were strongly agreed upon, but those for emotionally

negative events were not (the interpretability of results regarding experiencing discrimination is limited because of the fact that half of all mentions of that event were from a single participant). Unique findings were obtained, however, with the distribution of emotionally negative and neutral events and the mean valences of lifetime periods. With regard to the distribution of emotionally negative and neutral events, approximately 63% of those events were expected to occur before age 30, whereas that percentage in prior research with a Dutch sample (Janssen & Rubin, 2011) was 50%. However, there is not much of an implication for this finding on the current formulation of the cultural life script account. Because a combination of the shapes of the lifespan distributions of emotional events *and* prescribed timings are required to structure autobiographical recall, these findings do not suggest that the observed life script would lead to differences in the reminiscence effect for African Americans. Similarly, the finding that lifetime periods after age 30 tend to be emotionally positive while those periods tend to be emotionally negative in prior research does not indicate differences in the way that the observed life script would structure autobiographical recall differently either. Overall, one should expect that, based on the predictions of the cultural life script account and the findings of the current study, African Americans would produce similar reminiscence effects in the autobiographical recall as other, previously examined populations. In summation, the findings of Chapter 2 support the stability of the properties of the life script and strengthen the life script account as described by Rubin and Berntsen (2003). Importantly, the findings demonstrate that the key properties of the life script necessary for structuring the recall of highly emotional autobiographical memories were found to

generalize to an unfairly treated minority population and suggest that the cultural life script account's predictions regarding the reminiscence remain unchanged as well.

While the findings of Chapter 2 strengthen the cultural life script account of reminiscence, the implications for the findings of Chapter 4 on that account are mixed. In it, research was reported which was intended to provide additional evidence for the existence of life scripts. Specifically, the goal of Chapter 2 was to demonstrate that the typicality effect, which happens with other forms of scripted information, happens with life script information, thereby suggesting that (1) they are a script, similar to other types of scripts, and (2) that they are represented in semantic memory. The findings of Experiment 1 show that, as predicted, the typicality effect did occur. Using life events varying in typicality as a function of age appropriateness, recognition memory was better for atypical than typical life script events and more typical than atypical life script events were recognized falsely. However, there exists the potential that the observed effects were driven not by typicality, but by differential memorability of items due to the emotional valence and importance of the life script events used as critical items, as well as the age of the character for which they were presented. First, the numbers of emotionally positive and negative events used as critical items in Experiment 1were not equal and their presentation was not counterbalanced. Second, the perceived importance of critical items was unknown, as that variable was not collected in the pretest condition. Therefore, Experiment 2 was conducted to attempt to address concerns over those potential confounds. By testing recognition memory for unscripted items for which importance was held constant, that varied as a function of emotion and were presented as occurring to characters of varying ages, it was expected that no differences in recognition

would be observed based on emotion and age of the character. However, this was not the case. Despite the use of unscripted items, recognition memory varied as a function of emotional valence and the age of the character suggesting that there was an effect of typicality without the activation of a script, in the sense described by Schank and Abelson (1977). Rather, it seems that knowledge associating youth with positive emotional valence and old age with negative emotional valence, a pattern similar to the relation between emotional events and age in the life script was activated. Possibly, this knowledge is in the form of a schema rather than a script, in which certain general affective states are more associated with one lifetime period than another. Extensive research has demonstrated the tendency for schemas to exert an effect in associating items or concepts with one another (Brewer & Treyens, 1981). The existence of a life schema associating age and emotion does not necessarily preclude the existence of life scripts but does allude to the possibility that life scripts may have related similar knowledge, even possibly derived from the life script itself, that is activated simultaneously with it.

It should be made clear what the implications of these findings are for the cultural life script account. They do not suggest any changes to the structure of life scripts, the way they distribute emotional events and the way in which the timings of emotionally positive events are highly prescribed, while those for emotionally negative events are not. They do not contradict any of the claims of the cultural life script account regarding the ability of the life script to structure autobiographical recall and produce the reminiscence effect for emotionally positive, but not emotionally negative events. What they do bring into question is the form in which the life script is represented in memory and the

possibility that highly similar, related information is present which may be involved in the processing of information about emotional life events. However, further research directly examining this issue will be required to draw stronger conclusions about the existence of schemas relating youth with positive emotion and old age with negative emotion. A paradigm specifically designed for that purpose would likely be necessary to disentangle the relative effects of that knowledge/schema and life scripts in the processing of information about emotional life events, or at the very least, causing the typicality effect with such information.

Overall, the cultural life script account of the reminiscence effect (Rubin & Berntsen, 2003) continues to be a strongly supported, highly effective account of the reminiscence effect and the recall of highly emotional autobiographical memories. In light of the findings from the current dissertation, it is clear that the properties of the life script are stable across a variety of situations including across majority and minority populations. While it seems clear that they are a form of script, based on the findings from Chapter 4 it remains unclear if they are similar to forms of scripts previously examined in tests of the typicality effect, or if they differ in key ways, and are supplemented by additional knowledge.

2: IMPLICATIONS FOR THE REMINISCENCE EFFECT

The findings of the current dissertation have several implications for accounts of the reminiscence effect. Two tests of the reminiscence effect were reported: One in which the distribution of African Americans' memories of unfair treatment across the lifespan was investigated (Chapter 3); and one in which the life story account of the reminiscence effect was tested (Chapter 5). The findings from Chapter 2, the test of

African Americans' life script, also have implications for the status of the reminiscence effect.

While the results of Chapter 3 show that a reminiscence effect was not observed, the goal of the study—to present a test of the reminiscence effect with an African American sample--is important in that such a study constitutes an important contribution to our understanding of the reminiscence effect. As it stands, this study is the only reported investigation of the reminiscence effect with African Americans or any unfairly treated minority sample. In light of the findings of Chapter 3, the predictions of the cultural life script and life story account remain unchallenged. Save for the exception of history-graded events, the recall of which does not entail a special cognitive mechanism, or findings regarding memories of when one was most jealous (Rubin & Berntsen, 2003), no study has yet to demonstrate a reminiscence bump for emotionally negative events. Furthermore, the reminiscence effect for memories of when one was most jealous could be attributed to a confounding of those memories with when one was most in love. Overall, the findings of Chapter 2 do not support the likelihood that the autobiographical recall of African Americans would entail a reminiscence effect for emotionally negative memories as well.

The cultural life script and life story accounts of reminiscence are also strengthened by the findings of Chapter 5. In Chapter 5, prior findings that the bump occurs for life story, but not non-life story events were extended to include other variables that are indicators of life story events, supporting the predictions of the life story account. In addition, the life story account was further supported by demonstrating that its predictions extend to a sample varying from those of prior research in several

ways. The current study presented the first test of the life story account with a U.S. sample, as well as the first test of the life story account with a sample of young adults, i.e., college undergraduates.

For the most part, the findings of the current dissertation bolster the cultural life scripts and life story accounts of the reminiscence effect. Chapters 2 and 5 do so by presenting support for their predictions whereas Chapter 3 does so by failing to find evidence contradicting the claims of those accounts that the reminiscence effect only occurs for highly positive, and not highly negative, emotional memories. However, while Chapter 3 failed to find support for its hypothesis that the reminiscence effect occurs in distributions of memories for unfair treatment. However, this finding does not rule out the possibility that differences might be observed in the reminiscence effect between African Americans and previously examined populations. Only by testing the reminiscence effect with an African American sample *and* procedures similar to existing tests can that be determined. Ultimately, further research needs to be done to draw more definitive conclusions about the role of minority status in autobiographical recall.

3: DIRECTIONS FOR FUTURE RESEARCH

Since being introduced, numerous studies have supported the cultural life script and life story accounts of the reminiscence effect. The research presented in the current dissertation represents only a few of the experimental paradigms available to test the predictions of these accounts. Recent research has demonstrated several new avenues for examining the cultural life scripts and life story accounts that can lead to innovative research. For instance, beyond tests of the bump and life script generation procedures, support for the cultural life script account has also been demonstrated by examining very

young children's prospective life stories, which findings show conform to the structure of cultural life scripts (Bohn & Berntsen, 2010). Research has also recently focused on the relationship between life story chapters (similar to Conway's lifetime periods) and cultural life script events (Thomsen & Berntsen, 2008; Thomsen et al., 2011), as the latter usually represent beginnings and endings of the former. Other recent research includes an investigation to determine further the qualities of life story memories and their role in memory. However, rather than looking at memories across the lifespan, they were able to examine the qualities of life story memories by looking at undergraduates' memories of their first year at college (Thomsen et al., 2012). Together, these studies indicate the variety of potential lines of inquiry that can follow from the cultural life script and life story accounts.

However, the potential for new research is not exclusive to such alternative investigations of the cultural life script and life story accounts. There is still great potential for learning more about the cultural life script and life story accounts with tests of the reminiscence effect and life script generation procedures, such as those reported in the current dissertation. One avenue of inquiry that has not been fully investigated is the possibility that special populations, such as clinical populations or individuals that have experienced off-script lives, may produce differential results with regard to their recall of highly emotional autobiographical memories. To date, tests of these effects have almost exclusively been confined to healthy populations. Moreover, the majority of them have utilized undergraduate samples that, ostensibly, are living very "on-script" lives, meeting all of their important milestones at the culturally expected time. Possible candidate clinical populations include those with clinical depression, recovering alcoholics, or drug

addicts, who may display differential results due to their psychological condition, or because such lives inherently lead to experiencing off-script events or having different expectations of life events. One recent study is among the first to examine the effect of a psychiatric condition on autobiographical memory and life scripts. Findings show that patients with borderline personality disorder tended to report emotionally negative rather than emotionally positive, memories, and that their life scripts contain less mentions of normative life script events (Jørgensen, Berntsen, Bech, Kjølbye, Bennedsen, & Ramsgaard, 2012). As suggested earlier, it was unclear whether these differences reflected genuine identity disturbances or if these subjects actually had substantially different life experiences. With regard to non-clinical populations living "off-script" lives, potential candidate populations could include "non-traditional" college students, such as adult or middle-aged undergraduates or low SES groups who may have expectations about education and employment that are not adequately captured in college undergraduate samples.

However, observed differences in such groups might not contradict current accounts of the reminiscence effect. In their current iterations, these accounts can explain such differences. Reminiscence bumps may occur for emotionally negative events, but the events recalled would likely represent failures to fulfill life script events that are usually emotionally positive, such as failing to graduate high school at the appropriate time. Conversely, bumps for emotionally positive events may shift and distort as individuals ultimately fulfill those same cultural life script events at "off-script" times. For instance, an individual may graduate high school late, the consequence of which would be a chain reaction in which several life script events become delayed. As highly

emotional events representing the successful completion of culturally sanctioned, desirable events or developmental tasks, they are likely to be differentially recalled. Moreover, ultimately surpassing these milestones would make them even more personally salient, and the off-script nature of the individual's life would be an integral component of her or his life story or identity.

4: CLOSING REMARKS

The goal of the current dissertation was to investigate a variety of previously unexamined issues pertaining to the cultural life script and life story accounts. One of those previously unexamined issues was the effect of minority status on the life script and the reminiscence effect. Contrary to expectations, the predictions of the cultural life script and life story accounts were not contradicted. Rather than contributing demonstrations of novel effects, those studies contribute to our understanding of autobiographical memory by lending further support to those accounts and their claims that they do not vary cross-culturally. The goal of Chapter 4 was to demonstrate the typicality effect with life scripts, thereby lending support to the premise that they are represented in semantic memory. While the mixed results that were obtained partially support that claim, they also suggest the possibility that knowledge about the relationship between emotion and age is represented in another form, possibly a schema that supplements life script knowledge, since the findings of Experiment 2 demonstrated the typicality effect without scripted information. Consequently, additional research is required to understand better the effect of typicality on memory for life script information and the potential presence of schemas relating emotion and age in semantic memory. One possibility is that alternative paradigms may be employed to test further the

typicality effect with life scripts by changing the testing stimuli or the memory task. The goal of Chapter 5 was to examine previously untested predictions of the life story account. By fully supporting those predictions, the findings from Chapter 5 lend further support to that account. The cultural life script and life story accounts of reminiscence continue to be strongly supported. They provide valuable frameworks for the investigation of autobiographical memory and understanding the processing of life story information. Undoubtedly, they will play important roles in future discoveries in the field of autobiographical memory research.

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