Bilingual Memory and Trauma:
Emotional Congruence, Narrative Detail, and Recall Accuracy

by

Zainah A. Al-Jundi

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science (MS)
Clinical Health Psychology
in the University of Michigan-Dearborn
2026

Master's Thesis Committee:

Dr. Nitya Sethuraman

Dr. Caleb Siefert

Zainah Abdulhaq Al-Jundi

zainahaj@umich.edu

© Zainah Abdulhaq Al-Jundi 2026

Acknowledgements

I would like to thank Dr. Nitya Sethuraman for her support as my primary advisor and for providing her guidance for my thesis. I am deeply appreciative of the time and thoughtful feedback she provided throughout this journey. I would also like to thank Dr. Caleb Siefert, the other memory of my thesis committee, for his time and valuable feedback. My sincere thanks to Dr. Michelle Leonard for her continuous support and encouragement throughout my graduate studies. In addition, I am grateful to Dr. Pam McAuslan for generously providing me access to her lab to conduct the interviews.

I am especially grateful to the participants who shared their personal memories and experiences. Their openness, trust, and willingness to participate made this research possible.

Finally, I would like to thank my family and friends, my greatest supporters from the very beginning. Their continuous love, patience, encouragement, and belief in me have given me the confidence to pursue my goals and persevere through every challenge. This accomplishment would not have been possible without them.

Table of Contents

List of Tables ..... **vi**

List of Appendices ..... **vii**

Abstract ..... **viii**

Chapter One Introduction **1**

Language Choice in Therapy **2**

Language-Dependent Memory **6**

Language and Emotion **8**

PTSD Treatment **10**

Language, Memory, and Emotions in PTSD Treatment 11

The Current Study **14**

Chapter Two Methods **16**

Participants **16**

Cue Word Stimuli 17

Scales **18**

Demographics 18

Language Proficiency and Immigration 18

Measure of Overall Psychological Functioning 18

Measure of Self-Esteem 19

Measure of Trauma-Related Symptoms 19

Procedure **20**

Coding **22**

Data Analysis **24**

Chapter Three Results **25**

Hypothesis 1: Language Match and Narrative Response **25**

Match versus Mismatch (Excluding Code-Switching) 25

Match versus Non-Match (Including Code-Switching) 26

Hypothesis 2: Language-Dependent Memory 27

Hypothesis 3: Negative Affect and Emotional Congruence 28

Hypothesis 4: Linguistic Distancing in L2 30

Hypothesis 5: Emotional Engagement in L1 and Trauma Symptoms 31

Hypothesis 6: Linguistic Distancing in L2 and Psychological Functioning 32

Hypothesis 7: Narrative Length in L1 and Self-Esteem 33

Chapter Four Discussion 34

Language-Dependent Memory and Recall Speed 35

Narrative Detail and the Role of Language Match 36

Emotional Expression and Emotional Congruence 37

Linguistic Distancing in the Second Language 39

Language, Emotionality, and Psychological Well-Being 40

The Importance of How L1 is Defined 42

Strengths and Limitations 43

Clinical Implications 46

Future Directions 47

Chapter Five Conclusion 47

References 49

List of Tables

Table 1 Emotional Valence of Cue Words 56
Table 2 Cue Words and Translation 56
Table 3 Paired-Samples t-tests Comparing Matched and Mismatched Memories (excluding code-switching) 57
Table 4 Paired Samples t-test Comparing Matched and Mixed Memories including code-switching) 57
Table 5 Paired Samples t-test Examining Language-Dependent Memory Recall 58
Table 6 One Sample t-test Examining Language-Dependent Memory Recall 58
Table 7 Paired-Samples t-test Comparing Negative Affect and Emotional Congruence Between Narratives According to Dominance 58
Table 8 Paired-Samples t-test Comparing Negative Affect and Emotional Congruence Between Narratives According to Acquisition 58
Table 9 Paired-Samples t-tests Comparing Linguistic Distancing Variables Between Narratives According to Dominance 59
Table 10 Paired Samples t-tests Comparing Linguistic Distancing Variables Between Narratives According to Acquisition 59
Table 11 Simple Linear Regression Predicting Trauma-Related Symptoms From Differences in Emotional Intensity Between Narratives According to Dominance 60
Table 12 Simple Linear Regression Predicting Trauma-Related Symptoms From Differences in Emotional Intensity Between Narratives According to Acquisition 60
Table 13 Multiple Regression Analysis Predicting Psychological Functioning From Linguistic Distancing Variables – According to Dominance 60
Table 14 Multiple Regression Analysis Predicting Psychological Functioning From Linguistic Distancing Variables – According to Acquisition 60
Table 15 Simple Linear Regression Analyses Predicting Self-Esteem From Differences in Narrative Length According to Dominance 61
Table 16 Simple Linear Regression Analyses Predicting Self-Esteem From Differences in Narrative Length According to Acquisition 61

List of Appendices

Appendix A: Verbal Instructions 62
Appendix B: Participant Order Log 66
Appendix C: Memory Coding Sheet 67
Appendix D: Informed Consent Psychology Subject Pool 68
Appendix E: Informed Consent External 70
Appendix F: Consent to Record Audio 72
Appendix G: Flyer 73

Abstract

Language plays an important role in how bilingual individuals access, narrate, and emotionally experience autobiographical memories. Although previous research has demonstrated the language-dependent memory effect, little is known about how language influences emotional engagement during memory recall or its relationship with psychological functioning among Arabic-English bilingual immigrants. This study examined whether recalling memories in the language in which they originally occurred influences memory accessibility, narrative detail, emotional expression, and linguistic distancing. It also explored whether language-related differences in emotional engagement were associated with trauma symptoms, psychological functioning, and self-esteem.

Twenty Arabic-English bilingual adults recalled autobiographical memories in both Arabic and English in response to cue words presented in each language. Participants also completed measures of trauma symptoms, psychological functioning, self-esteem, and language background. Narrative responses were analyzed using the Linguistic Inquiry and Word Count (LIWC-22) program, and paired-samples *t*-tests and regression analyses were conducted using SPSS.

Results supported the language-dependent memory effect where participants were significantly more likely to retrieve memories in the language in which they originally occurred and recalled them more quickly when the interview language matched the language of encoding. Greater negative emotional expression, higher authenticity, and lower narrative arc scores were observed in participants' first-acquired language, but not in their dominant language. Greater emotional intensity during first-language recall significantly predicted higher trauma symptom

severity, whereas longer narratives in the dominant language predicted higher self-esteem. Linguistic distancing was not significantly associated with overall psychological functioning.

These findings suggest that language influences both the accessibility and emotional expression of autobiographical memories. They also demonstrate that bilingual research findings depend on whether language proficiency is defined by first language acquired or dominant language, with important implications for clinicians working with bilingual clients discussing emotionally significant or traumatic experiences.

Keywords: bilingualism, bilingual memory, language-dependent memory, emotional expression, trauma, Arabic-English bilinguals

Chapter One Introduction

As global migration and displacement rise, the number of bilingual individuals seeking psychological support is increasing (Forray et al., 2024; Verkerk et al., 2024). According to Forray and colleagues (2024), global forced migration has affected around 112 million individuals worldwide, with refugees accounting for 35.3 million, leading to an increase of individuals in need of psychological support who might not speak the language of the host country. Bustamante et al. (2017) reported that approximately 47% of immigrants, particularly refugees, experience posttraumatic stress disorder (PTSD) following immigration. Given the high prevalence of trauma-related symptoms among immigrant populations, understanding the factors that influence the effectiveness of psychological treatment is especially important. Therapy may be helpful for many displaced individuals who carry significant trauma because they did not choose to move and were unprepared, but a lack of access to bilingual practitioners and contexts may make the therapy less effective (Demir, 2023).

Although bilingualism is increasingly common among individuals seeking psychological services, psychotherapy has largely been developed from a monolingual perspective (Costa & Dewaele, 2018). Many clinical approaches assume that the language used during treatment has little influence on the therapeutic process, overlooking evidence that different languages may evoke varied emotional responses, autobiographical memories, and aspects of identity (Pavlenko, 2012; Schrauf, 2000). Consequently, the language of therapy is typically ignored as a clinically meaningful variable, treated as a practical issue of communication.

Studies on the effectiveness of therapeutic interventions have mostly focused on monolinguals despite the fact that most people around the world are multilingual. However,

since bilingual clients and bilingual therapists have access to multiple languages during their therapeutic interactions, prior work has found that the language choices made by both parties might influence the nature of their sessions, and therefore affect the results of therapy (Byford, 2015). Use of both languages in therapy sessions may be particularly important for patient recovery, including recovery from significant trauma and PTSD.

Given the increasing linguistic diversity of individuals seeking mental health services, it is important to better understand how language influences the retrieval and expression of emotionally significant memories. The current study investigates the emotional content of memories provided by bilingual Arabic-English speakers in a structured interview setting. The study examines the influence that language might have on the richness and detail of memories when bilingual participants discuss positive and negative memories in each of their languages. Although this is not a clinical setting, the results of this study have practical implications in terms of whether language should be considered a meaningful variable in clinical settings.

Language Choice in Therapy

The initial goal in psychotherapy is to form an alliance between the therapist and the client to allow for better communication during the sessions for improved outcomes (Guazzo, 2024). Several studies have found that the language choice and style used in therapy, even when the therapist and client speak the same language, can affect therapy outcomes. For example, clients are found to change their language style (producing similar rates of function words like pronouns, prepositions, and conjunctions) to match their therapists, emphasizing linguistic coordination regardless of context (Aafjes-van Doorn et al., 2020). Additionally, the accent spoken by the client or therapist might communicate a certain socioeconomic or cultural status

that they belong to, which could influence the sense of comfort in the relationship (Al-Mahroos & Di Braccio, 2022). Patients may also unconsciously match the language style of their therapist, perceiving them to be from a higher status, in order to form an alliance (Aafjes-van Doorn et al., 2020).

Beyond style and accent, the specific language used during sessions can also shape the dynamics between therapist and client. For some therapists, speaking in Arabic activated characteristics that were not present in English, with one describing that she experienced "two therapeutic selves" where she felt like her motherly instincts were emphasized when empathizing with clients in Arabic, but not in English (Al-Mahroos & Di-Braccio, 2022). Clients also report feeling that therapists' multilingualism enhanced their empathy during sessions, increasing their comfort (Dewaele & Costa, 2013).

Limited access to multilingual therapy may also interfere with effective treatment. Research suggests that bilingual clients often organize and communicate their experiences differently depending on the language they are using, with each language activating different autobiographical memories, emotional meanings, cultural frameworks, and aspects of identity (Bager-Charleson et al., 2017; Marian & Kaushanskaya, 2011; Pavlenko, 2005). As a result, the same experience may be described differently across languages, in terms of the specific details that are recalled, the emotions that are expressed, and the meaning assigned to the event. These differences do not necessarily reflect inconsistencies in memory, but rather the influence of language on how autobiographical experiences are encoded, retrieved, and expressed (Marian & Kaushanskaya, 2011; Pavlenko, 2005), which may be interpreted in different ways by others, particularly impactful in therapeutic settings. If therapists are unaware of these language-specific

effects, they may overlook clinically relevant information or misinterpret variations in a client's narrative.

For bilingual individuals, different languages may be associated with different cultural values, relationships, life experiences, and aspects of identity (Al-Mahroos & Di-Braccio, 2022; Byford, 2015; Dewaele & Costa, 2013). As a result, switching languages may influence not only how clients describe their experiences, but also the emotions they express and the meaning they assign to those experiences. Therapists who are aware of these language-related differences are better able to understand the context in which clients' experiences occurred and recognize that language choice may reflect more than preference or proficiency, it may provide valuable insight into how clients access memories, make meaning of their experiences, and engage in the therapeutic process (Al-Mahroos & Di-Braccio, 2022; Smith et al., 2023).

One explanation for why language influences memory and emotion comes from linguistic relativity theory, which proposes that language shapes the conceptual framework through which people understand both the world around them and themselves (Marian & Kaushanskaya, 2011; Smith et al., 2023). Because languages differ in their vocabulary, cultural meanings, and emotional associations, bilingual individuals may think about, interpret, and communicate the same experience differently depending on the language they are using. Consequently, language choice in therapy may influence clients' emotional expression, and self-construal, as well as their engagement with therapeutic interventions. Understanding these individual differences is therefore essential when working with bilingual clients and provides an important foundation for examining how language influences autobiographical memory and emotional processing.

Differences in language use, including the clients’ regular use of two or more language, can influence the outcome of therapy, even when the therapist and client are speaking the same

language. Although it is not always possible for therapists to speak the same languages as their clients, it is important for them to understand the impact language has on the client's identity and worldview, as well as on the interventions being used (Al-Mahroos & Di-Braccio, 2022; Smith et al., 2023). This is particularly relevant in language-based therapies such as Acceptance and Commitment Therapy (ACT), where psychological flexibility is fostered through verbal processes, including cognitive defusion, acceptance, values clarification, and self-as-context (Hayes et al., 2011). Because these interventions rely heavily on the meanings, emotional associations, and functions of words, differences in language proficiency and emotional resonance across a bilingual client's languages may influence how therapeutic techniques are experienced and how effective they are.

It is important to study the outcomes of bilingual clients in therapy, however, research on bilingualism is challenging, as researchers do not agree on a single definition for bilingualism (Champoux-Larsson & Nook, 2024; Madrid, 2001). Multiple factors influence language development and usage in individuals, and inconsistent results are found due to individual differences, including age of acquisition, proficiency levels, language dominance, and contexts and intensity of social interaction during learning, (Chen et al., 2015; Liu et al., 2024; Sharif & Mahmood, 2023). Context and order of acquisition influence language processing in that individuals are more likely to acquire their first language naturally through social interactions during childhood, making the emotional connections stronger, whereas second languages are often acquired in academic settings which usually lack emotional experiences (Liu et al., 2024). However, increased social immersion in one’s second language could increase speakers’ emotional experiences, allowing them to understand emotional weight and develop automatic emotional processing (Chen et al., 2015; Liu et al., 2024). Additionally, emotional content

processing is modulated by proficiency (El-Dakhs & Altarriba, 2019), with higher proficiency in one's second language enhancing emotional resonance in both languages (Champoux-Larsson & Nook, 2024). These and other often conflicting factors in the study of bilingual language processing are important to keep in mind as potential influences on results in such studies.

Language-Dependent Memory

Memory is influenced by context, and language serves as a powerful contextual cue that shapes how memories are encoded and retrieved (Marian, 2020). Memory can be divided into implicit memory — where past experiences influence the individual's behavior without them consciously recalling or being aware of those experiences — and explicit (declarative) memory, which consists of conscious, intentional retrieval of information like factual details or personal experiences (Lane et al., 2015). Although the traditional view is to see language and declarative memory as separate functions with different neural pathways, more recent models suggest that language and memory should be seen as a single unique "Language Union Memory" network because they share automatic structures in the brain and communicate reciprocally (Roger et al., 2022).

Language is not only a fundamental tool for communication but also plays a significant role in how individuals encode, retrieve, and emotionally process memories, reflecting the close interrelationship between language and memory (Bailey et al., 2020; Bilgin et al., 2023; Madrid, 2001; Marian, 2020; Marian & Kaushanskaya, 2011; Marian & Neisser, 2000). Language has been proposed to act as a contextual framework for memory, influencing both the content of memories and the processes through which they are encoded, accessed, and recalled, consistent with the concept of context-dependent memory, which posits that internal and environmental

contexts shape memory encoding and retrieval (Marian & Kaushanskaya, 2011; Marian & Neisser, 2000).

Most research has focused on monolinguals, but the relationship between memory and language is even more complex in bilinguals. In bilinguals, the language spoken during an event becomes part of the memory trace, making language an important component of memory encoding (Marian & Kaushanskaya, 2011). This phenomenon supports the concept of language-dependent memory, a specific type of context-dependent memory in which individuals are more likely to recall events when the language used during retrieval matches the language in which the event was originally encoded (Marian, 2020). Supporting this, research has shown that bilingual participants are more likely to discuss events that occurred in the same language they are required to use during recall tasks (Marian, 2020).

It is not only that people are more likely to remember the event in the language it occurred in, but the level of detail in memory recall is also affected by the language of retrieval. The most genuine and detailed recall of autobiographical memories occurs when people recount an event in the same language in which the memory was encoded (Szoke et al., 2020). Moreover, participants more accurately recalled events of a story when the language of the story and recall matched, demonstrating the language-dependent recall effect (Bilgin, et al., 2023). Additionally, when recalling a memory in a different language than the one it occurred in, participants were more likely to remember information unrelated to the narrative being discussed (Foa & Kozak, 1986). Memories are also recalled more vividly when retrieved in the same language in which the memory occurred, with memory vividness decreasing when participants were asked to recall negative autobiographical memories (that occurred in their native language) using their second language (Jansson & Dylman, 2021).

The language used to retrieve memory also influences accuracy in bilinguals. Interestingly, false memories were more likely to occur when participants read stories in their second-acquired language (L2) but retrieved them in first-acquired language (L1), an effect attributed to an encoding-retrieval mismatch, where the language used during encoding does not match the language used during retrieval (Bilgin et al., 2023). Retrieving information in L1 may lead to more errors because L1 is more strongly associated with prior knowledge and personal experiences, including incorrect assumptions (Bilgin et al., 2023). These richer associations can cause individuals to interpret or elaborate on the original content more freely in L1, increasing the likelihood of forming false memories (Bilgin et al., 2023). To fully understand the role of language in therapeutic settings, it is essential to consider how language and memory interact, and this becomes even more complicated when considering how bilingualism shapes deeper cognitive and emotional processes.

Language and Emotion

Not only does language influence the encoding and retrieval of memories, it may also have an influence on the emotional processing of memories. Emotion can be understood as a system through which individuals assess how well their needs, values, or goals are being fulfilled in relation to their environment, causing them to respond with a set of changes (physiological, behavioral, and cognitive) to adapt to the situation (Lane et al., 2015). Even though one part of emotional responses is conscious (mental reactions like thoughts), emotions are mostly seen as automatic, resulting in an implicit judgement of the situation and unconscious physiological responses that occur without the awareness of one's thoughts (Lane et al., 2015). Therefore, a person's emotional responses might be elicited through certain situational factors that they are

unaware of. It is important to highlight that the following results must be interpreted with caution because of the variation in age of acquisition and language proficiency.

Language choice plays a key role in how bilinguals process and express emotions during therapy (El-Dakhs et al., 2024). Clients who used their first language in therapy were found to be able to experience deeper emotions and express early memories in greater detail, even when they were highly proficient in their second language (Byford, 2015). It is hypothesized that this easier access to emotions and details is due to early memories being encoded in the client's first language (Dewaele & Costa, 2013). Language effects dependent on age of acquisition and context of acquisition have been shown in studied of coordinate bilinguals, individuals who acquire their first and second languages in different contexts and at different ages (Schwanberg, 2006). Coordinate bilinguals show stronger brain activation in the posteromedial cortex, a region involved in attention modulation, episodic memory, and affective processing, when processing L1 emotional words compared to L2 emotional words (Del Maschio et al., 2024). This is consistent with the hypothesis that individuals experience stronger emotional resonance when processing words in their native language (Del Maschio et al., 2024).

Further influence of the context of language learning on emotional narration is shown in studies of coordinate bilinguals providing narratives of personal memories (El-Dakhs, et al., 2024). Coordinate bilinguals who learned and used their L2 only in academic settings were found to give more negatively valenced narratives in their L2 compared to their L1, perhaps because they did not have sufficient exposure to emotional situations in that context. Without more varied experiences, the extremes of the emotional scale (words rated as extremely negative based on their values in the Affective Norms for English Words; Bradley & Lang, 1999) may be used to express emotions that are not that intense (El-Dakhs et al., 2024).

Even though studies find that using the client's first language increases emotional resonance, discussing emotional experiences in one's second language could also be advantageous. Ivaz and colleagues (2016) suggest that one's second language influences automatic stages of emotional processing and creates more emotional distance. The client might prefer to use their second language to create some emotional distance for themselves when discussing highly emotional topics (Byford, 2015). Increasing awareness of the influence that language use has on client memory and emotions is essential to successful treatment of psychological disorders, especially disorders such as posttraumatic stress disorder (PTSD).

PTSD Treatment

Memory accuracy and detail is essential in the treatment of certain psychological disorders like PTSD, which is characterized by "reexperiencing a traumatic event in one's mind, avoidance of thoughts about the trauma, and concentration problems" (Nijdam et al., 2015). The ultimate treatment for PTSD revolves around memory reconsolidation, which is characterized as modifying and replacing dysfunctional memories (in terms of emotional responses) with more functional responses (Guazzo, 2024). This process requires remembering and uncovering an event to release emotions related to that event (Zasiekina, 2020). Clients with low memory accuracy were found to have worse therapeutic outcomes to trauma-focused treatment, indicating that having a functional, accurate memory is a predictor of recovery from PTSD (Nijdam et al., 2015).

Part of PTSD therapy includes facilitating the same context in which the memory occurred during the session, which enables the client to more accurately recall past events (Holmes, 1996). This process includes expanding the client's awareness by helping them

experience, label, reflect on, and work with the emotions linked to their trauma, while also integrating new insights provided by the therapist to facilitate proper memory reconsolidation (Lane et al., 2015). More recent studies suggest that the same principles apply for multilingual psychotherapy, but recreating the original emotional and linguistic context is a more complicated story when facilitating memory reconsolidation across both languages of the bilingual.

PTSD treatment is also more successful when there is a focus on the frequency of negative and positive emotions, allowing the therapist to determine if the client has processed traumatic information efficiently (Zasiekina, 2020). That is, if the client expressed more negative affect when recalling the traumatic event they experienced, they were more likely to have improved mental health (Zasiekina, 2020). This is linked to the avoidance and negative alterations of cognitions that an individual might engage in as a maladaptive coping strategy of their trauma (Ortigosa-Beltrán et al., 2023; Zasiekina, 2020). When clients avoid the negative experiences of their trauma and diverge their speech from their emotions, they experience less physiological responses and less habituation, negatively impacting the effectiveness of treatment in terms of desensitization and the reappraisal of traumatic events (Bailey et al., 2020). Participants who were able to talk about the traumatic event (as opposed to avoiding talking about it), were able to process the event, promoting their recovery (Zasiekina, 2020).

Language, Memory, and Emotions in PTSD Treatment

Bilingual clients working with monolingual therapists and not having access to both languages may face an extra barrier with typical trauma therapy involving desensitization and event processing (Bailey et al., 2020). Bilingual clients diagnosed with PTSD who immigrated to the US as adults usually experience better outcomes when therapy is conducted in their native

language, even when they are equally proficient in both languages (Szoke et al., 2020), because autobiographical memories in the same language in which the event occurred are found to have better recall (Marian & Neisser, 2000).

Having access to one's first language is important when treating PTSD because it not only facilitates access to memories but also influences how those memories are narrated. Trauma narratives among recent immigrants to the United States from the Middle East and Asia show marked differences between their first and second languages, with narratives in the participants' first language including more expressions of anger, cognitive processes (i.e., the use of casual and tentative language), and discrepancy, whereas narratives in their second language contained more positive emotion words and causal language (Bailey, et al., 2020).

The importance of affect, specifically theme-congruent affect related to negative emotions and anger, should also be considered in PTSD recovery. For instance, when a survivor recalls a traumatic assault, experiencing emotions such as fear, anger, or distress that match the emotional tone of the original event may influence how the memory is processed and integrated. Recent immigrant high school students who discussed their trauma in their first language were found to frequently mention more theme-congruent affect words, but showed decreased emotionality and increased idealistic, dismissive speech in their second language (Bailey et al., 2020). These findings may be explained by the reduced accessibility of emotional memories during L2 speech production, as well as the decreased availability of narrative-relevant information when recalling an event in a language different from the one in which it was originally experienced (Bailey et al., 2020). According to therapists who conduct bilingual therapy, clients are more likely to turn to their L2 when expressing strong affect, including when they talk about trauma or death (Kokaliari et al., 2013). Use of a second language can help create

some distance from the client and their traumatic memories, therefore representing certain intellectual parts of the person, instead of their emotional parts (Byford, 2015; Kokaliari et al., 2013).

In addition to using the client's first language, the use of both languages together during a session may also be helpful for effective therapy. When clients are encouraged to code-switch while talking about their traumatic memories, they are likely to articulate their trauma-related flashbacks as well as their generalized fear and anxiety better than if they were only using one language (Madrid, 2001). Interviews with bilingual therapists suggest that the client's second language might serve as a means through which they can start to consciously process and make sense of experiences that are denied or emotionally difficult to access in their first language (Kokaliari et al., 2013). Because PTSD symptoms may be experienced and expressed more intensely when bilingual individuals use their first language, allowing clients to choose when to speak in their first language, second language, or to code-switch between the two may facilitate therapy (Tehrani & Vaughan, 2009). Accessing traumatic experiences in the first language may promote emotional engagement, whereas shifting to the second language may provide emotional distance that helps clients process and make sense of those experiences.

Taken together, the literature suggests that language plays an important role in how bilinguals access autobiographical memories, express emotions, and engage in psychotherapy. Not only does the language used influence the therapeutic process, but clients who have lived most their life in their home country may drop out of therapy, or not even begin therapy, for PTSD when it's being conducted in their second language (regardless of their level of language proficiency), mainly because they perceive that the interventions are not culturally appropriate or adaptable (Gringer & Smith, 2006; Szoke et al., 2020). If the therapist does not speak the client's

first language, prolonged exposure therapy (PET) could start in the therapist/client's shared language and then eventually move to gradually encouraging the client to imagine the traumatic situation in their native language (Szoke et al, 2020).

The Current Study

Language choice has been associated with differences in memory retrieval, emotional expression, identity, and narrative style, all of which may influence the therapeutic process. However, much of the existing research has focused mostly on European languages or clinical observations, with relatively little empirical work examining Arabic-English bilinguals or exploring how language-related differences in autobiographical memory relate to emotional functioning. Given the growing number of bilingual individuals seeking mental health services, a better understanding of how language influences memory retrieval and emotional processing may help inform both bilingual memory research and clinical practice.

Building on prior work showing better recall of autobiographical memories for Russian-English bilingual adults in the same language in which the event occurred (Marian & Neisser, 2000), the present study examines how language influences autobiographical retrieval of memories among Arabic-English bilingual adults. Specifically, the current study investigates whether recalling memories in the same language in which they originally occurred facilitates faster retrieval and richer, more detailed narratives among Arabic-English bilinguals. The study also compares recall of memories in participants' first-acquired and dominant languages, in terms of greater emotional engagement and differences in emotional expression and narrative style. It is important to note that most research on bilingualism defines L1 as first-acquired language. However, for many bilinguals, their L1 is not their dominant language. Prior research

on bilinguals is often confusing to interpret because acquisition and dominance are often conflated, confused, or not controlled for. The current study keeps the convention of L1 referring to first-acquired language but examines language-dependent emotion and memory in terms of both first-acquired language as well as dominant language.

The present study also extends previous work on language-dependent memory (Marian & Neisser, 2000) by examining whether language-related differences in memory retrieval and emotional engagement are associated with trauma-related symptoms, psychological functioning, and self-esteem. Examining these relationships may provide a better understanding of the clinical significance of language-dependent memory and help clarify whether the language used to recall autobiographical memories is related to broader indicators of psychological well-being.

The current study examines the following hypotheses, which can be grouped under three larger categories:

Category 1: Language match and memory access.

H1: Participants will respond faster and narrate in greater detail when discussing events that occurred in the language of the memory.

H2: Participants will recall more memories about an event in the language in which the event originally occurred, supporting the language-dependent memory effect.

Category 2: Language use and emotional expression.

H3: Participants will express more negative affect and greater emotional congruence when discussing memories in their L1 and in their dominant language

H4: Participants will exhibit more detached, idealized, and dismissive speech patterns when discussing memories in their L2 and in their non-dominant language.

Category 3: Language and memory in relation to psychological outcomes.

H5: Participants who show greater emotional intensity and more negative affect when recalling memories in their L1 and in their dominant language will report higher trauma-related symptoms (IES-R).

H6: Participants who show greater emotional distancing in L2 (lower Authenticity and higher Analytic scores, LIWC-22) and in their non-dominant language will report better overall psychological functioning (SOS-10).

H7: Participants who narrate longer and more detailed memories in L1 and in their dominant language will report higher self-esteem (RSES).

Chapter Two Methods

Participants

Twenty-one participants (7 males, 14 females), recruited from the University of Michigan-Dearborn's psychology participant pool, the University of Michigan-Dearborn campus, and Muslim community associations (ACCESS, Thabaat, United Michigan Muslim Association) participated in this study. One participant was excluded because they did not provide sufficient narrative responses, resulting in a final sample of twenty participants (6 males, 14 females). All participants were Arabs who are Arabic-English bilinguals between the ages of 18 and 35 who had immigrated to the United States at least one to ten years prior.

To be eligible, participants were required to be fluent in both Arabic and English and currently reside in the U.S. Additionally, participants were required to indicate that their immigration experience was not highly traumatic or distressing. Because participants later completed a brief immigration narrative as part of the interview, individuals reporting highly

traumatic immigration experiences were excluded to avoid systematically biasing responses during the second language session. No participants were excluded due to this reason. All participants provided informed consent prior to participating. The study was reviewed and approved by the university's Institutional Review Board (IRB; HUM00279860) prior to the commencement of data collection.

Materials

Cue Word Stimuli

16 cue words, provided in Table 1, were taken from studies investigating the influence of emotionally charged words on language processing in Arabic-English bilinguals (El-Dakhs & Altarriba, 2019; Hmaidi, 2016; following Marian & Neisser, 2000's study of language-dependent memory in Russian-English bilinguals). Words from studies of Arabic-English bilinguals were selected in order to avoid potential translation-related issues and to ensure reliability. The emotional valence of the cue words, as identified by the researcher, are indicated in Table 1.

Cue words not already translated into Arabic by the original researchers were translated by the author. As shown in Table 2, the 16 cue words were randomly divided into two sets, with half the participants receiving Set 1 in English followed by Set 2 in Arabic and the other half receiving Set 1 in Arabic followed by Set 2 in English.

Prior to data collection, participants were randomly assigned to one of the predetermined language-order conditions using a random assignment generator. The assigned condition determined both the order in which the interview languages were administered and the corresponding stimulus set, such that participants received different cue word sets in each

language session. To counterbalance language order and control for sequence effects, half of the participants began with the Arabic session and the other half began with the English session.

Scales

Demographics

Participants first completed a demographic questionnaire that assessed their gender, current age, age at immigration to the United States, country of origin, and current educational status. Information about participants' language history and proficiency was collected separately using a language background questionnaire.

Language Proficiency and Immigration

The Language Experience and Proficiency Questionnaire (LEAP-Q; Marian et al., 2007) is a self-report measure that assesses overall language proficiency and experience in bilingual and multilingual individuals. It provides information on language acquisition, exposure, dominance, and preference, and was used in the current study to characterize participants' language backgrounds, including age of acquisition of each language and language dominance.

Measure of Overall Psychological Functioning

The Schwartz Outcome Scale-10 (SOS-10; Blais et al., 1999) is a self-report measure that assesses overall psychological functioning with a validated clinical cutoff score. The measure consists of 10 items scored on a 7-point Likert scale ranging from 0 (Never) to 6 (All or nearly all the time), based on how the participant felt over the past week. The total score ranges from 0 to 60, with higher scores indicating better psychological well-being. A sample item is "I feel

hopeful about the future." The scale demonstrates high internal consistency, with a reported Cronbach's alpha of .96, and strong test-retest reliability (r = .87) over a one-week interval. In the current sample, the SOS-10 demonstrated good internal consistency (α = .82)

Measure of Self-Esteem

The Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965) is a self-report measure used to assess overall self-esteem. It consists of 10 items scored on a 4-point Likert scale ranging from 1 (Strongly Agree) to 4 (Strongly Disagree). Five items are reverse coded, and the total score ranges from 10 to 40, with higher scores reflecting higher self-esteem. A sample item is "On the whole, I feel satisfied with myself," and a sample reverse-coded item is "I certainly feel useless at times." The measure demonstrates high test-retest reliability (r = .85 and r = .88) over a two-week period, as well as high construct and convergent validity. In the current sample, the RSES demonstrated good internal consistency (α = .85)

Measure of Trauma-Related Symptoms

The Impact of Event Scale-Revised (IES-R; Weiss & Marmar, 1997) is a 22-item self-report scale that measures subjective distress related to exposure to a specific stressor or traumatic event. Participants rated each item based on how distressing the symptoms had been during the past seven days, using a 5-point Likert scale ranging from 0 (Not at all) to 4 (Extremely). The measure examines three symptom dimensions: avoidance (e.g., "I tried not to think about it"), intrusion (e.g., "Any reminder brought back feelings about it"), and hyperarousal (e.g., "I felt watchful or on-guard"). A total score was calculated for each participant, with a score above 24 indicating significant distress, as well as a mean score for each symptom cluster.

The scale demonstrates high reliability and good construct validity. The IES-R demonstrated excellent internal consistency ($\alpha = .92$).

Procedure

The storytelling interview task was adapted from the autobiographical memory procedure developed by Marian and Neisser (2000). Participants attended a single laboratory session lasting approximately 90 minutes. Upon arrival, they reviewed and signed an informed consent form describing the study procedures. Participants were informed that the study examined storytelling in different languages and that they would complete storytelling tasks in both Arabic and English. To reduce demand characteristics, participants were kept naïve to the specific hypotheses regarding language and autobiographical memory.

After providing written consent, participants completed an online questionnaire through Qualtrics assessing demographic information, language background, language proficiency, age of language acquisition, preferred language for communication, country of origin, age of immigration, and current age. Participants also rated how traumatic or distressing their immigration to the United States had been.

Participants then completed the storytelling interview. Each participant completed one part of the interview in Arabic and the other in English. Interviews were conducted individually, entirely in the assigned language for each part of the session, with both the researcher and participant speaking only in the target language throughout.

Each language part of the session began with a brief warm-up task designed to increase participants' comfort speaking in the target language while discouraging code-switching. The warm-up task before the first session involved participants dividing their lives into four

chronological stages and briefly describing one event from each stage. This activity encouraged access to autobiographical memories across different developmental periods while familiarizing participants with speaking in the assigned language. The warm-up task before the second language session involved participants providing a brief narrative describing their immigration to the United States. This task served primarily as a transitional activity, helping participants shift from the first interview language to the second without directing retrieval toward either pre- or post-immigration memories.

Following each warm-up task, participants were presented with eight cue words in the appropriate language for their set, following participant assignment in Table 2. Across both interview sessions, participants responded to a total of 16 cue words, with eight presented in Arabic and eight in English. Cue words were presented individually, and participants were instructed to recall and narrate the first specific autobiographical memory that came to mind. They were also instructed to respond as quickly as possible to record response latency, defined as the time between presentation of the cue word and the beginning of the participant's verbal response. Narrative duration was also recorded and was defined as the time from the beginning of the participant's narrative response, following any initial questions or prompts for elaboration, until the end of the narrative. All interviews were audio-recorded for subsequent transcription and linguistic analysis.

After all 16 memories had been narrated, the researcher reviewed each memory with the participant in the language in which that memory had been recalled, using the Memory Coding Sheet given in Appendix C. For each memory, participants reported the language spoken during the original event, their age at the time of the event, and where the event occurred. Participants also rated the emotional valence (positive, negative, or neutral), emotional intensity (1–10), and

vividness (1–10) of each memory. A separate sheet was created for each memory, resulting in 16 memory coding sheets per participant.

Following the interview, participants completed three self-report measures assessing overall psychological functioning (SOS-10; Blais et al., 1999), self-esteem (Rosenberg Self-Esteem Scale [RSES]; Rosenberg, 1965), and trauma-related symptoms (Impact of Event Scale-Revised [IES-R]; Weiss & Marmar, 1997). Participants were then debriefed regarding the purpose of the study, informed how their data would be used, reminded of their right to withdraw, and provided with information about available psychological support services.

Coding

Audio recordings were transcribed in their original language using TurboScribe AI and subsequently reviewed by the researcher for accuracy. Arabic transcripts were translated into English using Google Translate and then carefully reviewed and edited by the researcher to preserve the intended meaning. Linguistic analyses were conducted using LIWC-22 (Boyd et al., 2022). For reliable analysis using LIWC-22, narratives must include 50 or more words. At the cue word level, some participants produced narratives that were fewer than 50 words. Therefore, for each participant, narratives were aggregated within each language, resulting in one Arabic narrative and one English narrative per individual.

The resulting LIWC variables were imported into SPSS along with questionnaire data downloaded directly from Qualtrics. To facilitate comparisons between linguistic and questionnaire variables, LIWC scores were averaged across each participant's Arabic narratives and English narratives, resulting in one Arabic score and one English score for each linguistic variable.

Text data generated from the interview task were subjected to quantitative linguistic analysis using the Linguistic Inquiry and Word Count-22 (LIWC-22) software (Boyd et al., 2022). The LIWC is a widely adopted, dictionary-based text analysis program designed to infer psychological, social, and structural characteristics from natural language. Previous studies examining trauma narratives in bilingual individuals (e.g., Bailey et al., 2020) have successfully employed LIWC to assess emotional and cognitive features of autobiographical recall.

The LIWC-22 software operates by comparing words within a given text against its internal dictionary, which comprises over 12,000 words organized into 117 psychologically relevant categories encompassing emotional processes (e.g., positive emotion, negative emotion), cognitive processes (e.g., insight, causation, discrepancy), social processes (e.g., family, friends), and linguistic markers (e.g., pronouns, articles). For each analyzed text file, LIWC-22 calculates the percentage of words from each category present in the text, allowing for systematic quantification of linguistic cues indicative of underlying psychological states, cognitive styles, and interpersonal dynamics.

This study used four summary scores given by LIWC-22, Analytic Thinking, Clout, Authenticity and Emotional tone. Analytic Thinking reflects the degree to which language is more formal, logical, and hierarchical: higher scores indicate more structured and analytical thought, while lower scores suggest more narrative or informal expression. Clout provides a composite index of the relative use of words associated with social status, confidence, and leadership, with higher scores suggesting more dominant or authoritative language. Authenticity reflects the degree to which more personal, humble, and emotionally genuine language is used, with higher scores associated with more authentic and less guarded expression. Emotional tone

reflects the ratio of positive to negative emotion words, with higher scores indicating a more positive emotional tone.

In addition to these summary variables, the current study used specific LIWC-22 category scores, specifically negative emotion words, positive emotion words, function words, word count, words per sentence, and big words (words of six or more characters), used to operationalize narrative detail, emotional content, and linguistic complexity across the two languages of the bilingual participants

Data Analysis

The majority of analyses used within-participant models to compare narrative characteristics, response latencies, and linguistic variables between the Arabic and English interview sessions. Interview data were first aggregated at the participant level using SPSS by computing mean scores for each variable of interest separately for the Arabic and English sessions, as well as for participants' first-acquired and dominant languages. These aggregated scores were then restructured into wide format and merged with demographic and self-report data collected through Qualtrics.

Because previous research has reported differences depending on whether bilingualism is defined by first-acquired language or dominant language, analyses examining language effects (Hypotheses 3–7) were conducted twice using both definitions. All statistical analyses were performed using SPSS (Version 29).

Code-switching was defined as memories in which participants reported that both Arabic and English were used during the original event (LangMatch = 2). Because these memories did not represent a clear language match or mismatch, some analyses were conducted both excluding

and including code-switched memories. Excluding these memories allowed for a direct comparison between matched and mismatched language conditions, whereas including them provided a more comprehensive representation of bilingual memory retrieval.

Chapter Three Results

Hypothesis 1: Language Match and Narrative Response

To examine whether participants responded faster and narrated in greater detail when the language of the interview matched the language in which the memory originally occurred, two sets of paired-samples *t*-tests were conducted. In the first set, response latency and narrative detail were compared between trials where the language of the memory matched the interview language (match condition, LangMatch = 1) and trials where it did not (mismatch condition, LangMatch = 0). Code-switched memories (LangMatch = 2), in which both languages were present during the original event, were excluded from this comparison to maintain a clear distinction between matched and mismatched conditions. Five paired-samples *t*-tests were conducted using mean response latency (seconds), mean narrative length (seconds), mean LIWC word count, mean percentage of function words, and mean percentage of big words as dependent variables. Lower function word percentages were interpreted as indicating more content-dense, detail-rich narration, consistent with LIWC-22 interpretation guidelines (Tausczik & Pennebaker, 2010).

Match versus Mismatch (Excluding Code-Switching)

When code-switched memories were excluded from the analysis, participants responded significantly faster when the language of the interview matched the language in which the

memory originally occurred (M = 5.28 seconds, SD = 2.54) than when it did not (M = 7.91 seconds, SD = 6.74), $t(19) = 1.88$, $p = .038$ (one-tailed), $g = -.40$. However, no significant differences were found for any of the narrative detail measures, including narrative length, LIWC word count, function words, and big words (all $ps > .05$). These findings suggest that although participants retrieved matched memories more quickly, they did not produce more detailed narratives when recalling those memories.

Match versus Non-Match (Including Code-Switching)

To determine whether the language-match advantage remained when code-switched memories were included, a second series of paired-samples *t*-tests compared the match condition against a broader non-match condition combining mismatched and code-switched memories (LangMatch = 0 and LangMatch = 2). For participants who contributed both mismatch and code-switched trials, the non-match score was computed as the average of the two condition means using SPSS's MEAN() function, which accommodates missing values.

Participants again responded significantly faster when the interview language matched the language in which the memory originally occurred (M = 5.28 seconds, SD = 2.54) than when the language was mismatched or participants reported code-switching during the memory (M = 7.60 seconds, SD = 5.19), $t(19) = -2.14$, $p = .046$, $g = -0.46$), replicating the previous finding.

Regarding narrative detail, participants produced significantly longer narratives, as measured by LIWC word count, when the interview language matched the language of the memory (M = 653.95, SD = 514.01) than when the language was mismatched or code-switched (M = 425.43, SD = 513.59), $t(19) = 2.04$, $p = .028$ (one-tailed), $g = 0.44$. No significant

differences were found for the remaining measures of narrative detail, including narrative length, function word use, and big word use (all *ps* > .05).

Overall, Hypothesis 1 received partial support. Participants consistently retrieved memories more quickly when the interview language matched the language in which the memory originally occurred. Evidence for greater narrative detail was more limited and was observed only for LIWC word count when code-switched memories were included in the comparison.

Hypothesis 2: Language-Dependent Memory

To examine whether participants were more likely to recall memories in the language in which the original event occurred, two complementary analyses were conducted. First, a one-sample *t*-test compared each participant's overall language-match proportion, calculated as the number of matched memories divided by the total number of matched and mismatched memories (excluding code-switched memories), against a chance level of 50%. Second, following the procedure used by Marian and Neisser (2000), paired-samples *t*-tests compared the number of Arabic memories, English memories, and mixed (code-switched) memories recalled across the Arabic and English interview sessions. Code-switched memories were treated as a separate category and analyzed independently, consistent with the original study.

A one-sample *t*-test comparing participants' overall match proportion to chance (50%) indicated that participants were significantly more likely to recall memories in the same language in which the event originally occurred ($M = .59$, $SD = .12$), $t(19) = 3.64$, $p = .002$, $g = 0.78$. This finding supports the language-dependent memory hypothesis.

To further examine this effect, paired-samples *t*-tests were conducted comparing memories that originally occurred in Arabic, memories that originally occurred in English, and mixed memories (i.e., memories in which participants reported code-switching). Participants recalled significantly more Arabic memories during the Arabic interview ($M = 5.10$, $SD = 1.99$) than during the English interview ($M = 3.70$, $SD = 1.75$), $t(19) = 3.62$, $p = .002$, $g = 0.78$. Similarly, participants recalled significantly more English memories during the English interview ($M = 2.30$, $SD = 1.87$) than during the Arabic interview ($M = 1.25$, $SD = 1.33$), $t(19) = -2.93$, $p = .009$, $g = -0.63$. In contrast, the number of mixed (code-switched) memories recalled did not significantly differ between the Arabic ($M = 1.65$, $SD = 1.57$) and English ($M = 2.00$, $SD = 1.49$) interview sessions, $t(19) = -0.88$, $p = .39$.

Overall, these findings support Hypothesis 2 and replicate previous research demonstrating that autobiographical memories are more readily retrieved when the language used during recall matches the language in which the original event was experienced.

Hypothesis 3: Negative Affect and Emotional Congruence

The third hypothesis predicted that participants would express greater negative affect and demonstrate greater emotional congruence when recalling memories in their first language than in their second language. Because bilingual individuals are not always dominant in their first-acquired language and previous research has reported different language-emotion effects depending on whether language is defined by order of acquisition or current dominance, all analyses were conducted twice using both language classifications.

Emotional congruence was operationalized as the proportion of memories whose emotional valence (judged by participants at the end of the interview as positive, negative or

neutral) matched the valence of the cue word as rated by the researcher before the start of the study, as shown in Table 1. Emotional valence for their 16 memories were coded by the participant at the end of the interview for each of the 16 memories using the Memory Coding Sheet (Appendix C). A memory was considered emotionally congruent when a participant recalled a memory rated as negative in response to a negative cue word or a memory rated as positive in response to a positive cue word. Conversely, a memory was considered emotionally incongruent when its reported emotional valence did not match the cue word or rated a memory as emotionally neutral regardless of the cue word presented. The emotional congruence percentage variable was created in Excel, by dividing the number of emotionally congruent narratives by the total number of narratives (8) for each participant in Arabic and English.

No significant differences were found between dominant and non-dominant language on any of the variables examined, including LIWC negative emotion, negative tone, overall affect, percentage of emotional congruence, and the proportion of negatively valenced memories.

By contrast, participants expressed significantly more negative emotion, as measured by the LIWC negative emotion category, when narrating memories in their first-acquired language ($M = 1.91$, $SD = 0.78$) than in their second language ($M = 1.39$, $SD = 0.94$), $t(19) = 1.96$, $p = .033$ (one-tailed), $g = 0.42$. No significant differences were found between languages for negative tone, overall affect, percentage of emotional congruence, or the proportion of negatively valenced memories.

Overall, Hypothesis 3 received partial support. Greater negative emotional expression was observed in the participants' first-acquired language but not in dominant language, whereas emotional congruence did not differ between languages regardless of order acquisition or dominance.

Hypothesis 4: Linguistic Distancing in L2

The fourth hypothesis predicted that participants would demonstrate greater emotional distancing when recalling memories in their second language and non-dominant language than in their first language and dominant language. As with Hypothesis 3, analyses were conducted separately using both first-acquired language and dominant language classifications.

A series of paired-samples *t*-tests compared LIWC-22 Authenticity, Analytic Thinking, Emotional Tone, Clout, Narrative Arc, Positive Tone, Positive Emotion, and self-reported positive memory valence between languages. Greater Authenticity, Emotional Tone, and Narrative Arc scores were expected in the first language, reflecting more genuine, emotionally engaged, and coherent narratives, whereas higher Analytic Thinking scores were expected in the second language, reflecting greater emotional distancing.

No significant differences were found on any of the LIWC variables when language dominance was examined.

By contrast, participants scored significantly higher on LIWC Authenticity when narrating memories in their first-acquired language ($M = 94.25$, $SD = 7.87$) than in their second language ($M = 90.65$, $SD = 8.51$), $t(19) = 2.77$, $p = .012$, $g = 0.59$. Participants also obtained significantly higher Narrative Arc scores when narrating memories in their second language ($M = 23.89$, $SD = 14.94$) than in their first language ($M = 5.45$, $SD = 16.98$), $t(19) = -3.29$, $p = .004$, $g = -0.71$. Analytic Thinking was higher in the first-acquired language ($M = 20.89$, $SD = 12.61$) than in the second language ($M = 13.83$, $SD = 7.82$); however, this difference did not reach statistical significance, $t(19) = 1.98$, $p = .062$.

Overall, Hypothesis 4 received partial support. Participants produced more authentic narratives in their first language and higher Narrative Arc scores in their second language. No significant differences were observed for language dominance.

Hypothesis 5: Emotional Engagement in L1 and Trauma Symptoms

The fifth hypothesis predicted that participants who demonstrated greater emotional engagement when recalling memories in their first language and dominant language would report higher trauma-related symptoms, as measured by the Impact of Event Scale-Revised (IES-R). Difference scores were computed by subtracting second-language means from first-language means for emotional intensity ratings (Diff_Intensity = MeanIntensity_L1 − MeanIntensity_L2) and LIWC negative emotion scores (Diff_NegAffect = NegEmo_L1 − NegEmo_L2), such that positive values reflected greater emotional engagement in the first language.

An initial hierarchical regression controlling for immigration-related variables and language proficiency (age of immigration, years since immigration, Arabic proficiency, and English proficiency) in the first block did not significantly improve model fit, $\Delta R^2 = 0.14$, $\Delta F(4, 15) = 0.62$, $p = 0.65$**,** indicating that these variables did not meaningfully contribute to the prediction of trauma symptoms. Therefore, a simplified regression model was conducted using only the difference in emotional intensity between first-acquired language and second language as the predictor.

Using language dominance, the simplified regression model was significant, $F(1, 18) = 6.10$, $p = .024$, $R^2 = .25$, indicating that the difference in emotional intensity accounted for approximately 25% of the variance in IES-R scores. Greater emotional intensity when recalling memories in the dominant language relative to the non-dominant language significantly

predicted higher trauma symptom scores, β = 0.503, $t(18) = 2.47$, $p = .024$, 95% CI [1.06**,** 13.16], supporting Hypothesis 5.

When order of acquisition was examined, the simplified regression model explained approximately 19% of the variance in IES-R scores, $F(1, 18) = 4.24$, $p = .054$, $R^2 = .19$. Greater emotional intensity when recalling memories in the first-acquired language relative to the second language also predicted higher trauma symptom scores, β = 0.44, $t(18) = 2.06$, $p = .054$, 95% CI [-0.109**,** 10.951]. However, this effect did not reach statistical significance.

Overall, Hypothesis 5 received partial support. Greater emotional intensity during dominant-language recall significantly predicted higher trauma symptom severity. While a similar pattern was observed for recall in the first-acquired language, this relationship did not reach statistical significance.

Hypothesis 6: Linguistic Distancing in L2 and Psychological Functioning

The sixth hypothesis predicted that participants who demonstrated greater linguistic distancing in their second language and non-dominant language would report better overall psychological functioning, as measured by the SOS-10. Linguistic distancing was operationalized using two difference scores: Diff_Authentic = Authentic_L1 − Authentic_L2, with higher scores indicating lower authenticity in the second language, and Diff_Analytic = Analytic_L2 − Analytic_L1, with higher scores indicating greater Analytic Thinking in the second language.

These difference scores were entered simultaneously as predictors in multiple regression models with SOS-10 scores as the dependent variable. Analyses were conducted separately using both first-acquired language and dominant language classifications.

The overall regression model for dominant language was not significant, $F(2, 17) = 0.99$, $p = 0.39$, $R^2 = 0.11$. Neither the difference in Authenticity ($\beta = 0.33$, $t(17) = 1.41$, $p = 0.18$) nor the difference in Analytic Thinking ($\beta = -0.01$, $t(17) = -0.06$, $p = 0.95$) significantly predicted SOS-10 scores.

The same analyses were repeated for first-acquired language. Again, the overall regression model was not significant, $F(2, 17) = 0.11$, $p = 0.89$, $R^2 = 0.01$. Neither Authenticity ($\beta = 0.13$, $t(17) = 0.47$, $p = 0.65$) nor Analytic Thinking ($\beta = -0.04$, $t(17) = -0.13$, $p = 0.89$) significantly predicted psychological functioning.

Overall, Hypothesis 6 was not supported.

Hypothesis 7: Narrative Length in L1 and Self-Esteem

The seventh hypothesis predicted that participants who produced longer and more detailed autobiographical narratives in their first language and dominant language would report higher self-esteem, as measured by the Rosenberg Self-Esteem Scale (RSES). Narrative length difference scores (Diff_Length = MeanLength_L1 − MeanLength_L2) were calculated so that positive values reflected relatively longer narratives in the first language.

Simple linear regression analyses examined whether narrative length differences predicted self-esteem. Additional regression analyses also included LIWC word count as a measure of narrative detail. Analyses were conducted separately using first-acquired language and dominant language classifications.

A simple linear regression indicated that the difference in narrative length between dominant and non-dominant language significantly predicted self-esteem, $F(1, 18) = 8.52$, $p = 0.01$, $R^2 = 0.33$. Greater narrative length in the dominant language significantly predicted higher

self-esteem scores (β = 0.58, $t(18) = 2.92$, $p = 0.01$, 95% CI [0.44, 0.27]). Participants who produced relatively longer narratives in their dominant language reported higher levels of self-esteem.

A multiple regression including narrative length and LIWC word count in the first-acquired language as predictors was not significant, $F(2, 17) = 0.05$, $p = 0.96$, $R^2 = 0.006$. Neither narrative length (β = -0.14, $t(17) = -0.29$, $p = 0.78$) nor word count (β = 0.14, $t(17) = 0.29$, $p = 0.78$) significantly predicted self-esteem.

Overall, Hypothesis 7 received partial support, as the predicted relationship was observed only for the dominant language but not for the first-acquired language.

Chapter Four Discussion

The purpose of the present study was to examine how language in Arabic-English bilingual adults influences autobiographical memory recall, narrative detail, emotional expression, and psychological well-being. The current study had three goals. First, the study investigated whether the language-dependent memory effect holds in Arabic-English bilinguals by testing whether the match between the language of the interview and the language in which the memory originally occurred facilitated faster recall and richer narrative detail, and whether participants were more likely to recall memories when speaking the language in which they originally occurred. Second, the study investigated whether one of the bilingual's languages affected emotionality, examining this in terms of first-acquired language or dominant language, as these were not the same for every bilingual participant. Specifically, the study examined whether narration in the dominant or first-acquired language led to more negative affect and emotional congruence, and whether narration in the non-dominant or later-learned language was

associated with more linguistically-distanced speech. Finally, the study explored whether the difference in emotional engagement between narratives in the dominant or first-learned language predicted trauma-related symptoms, psychological functioning, and self-esteem. The findings of the present study provide important information about how using one's first-learned or dominant language in therapy, especially when discussing highly emotional memories, can influence their narrative and emotional intensity. These results have important implications for clinicians working with bilingual and multilingual patients.

Language-Dependent Memory and Recall Speed

Strong support was found for prior findings that participants are more likely to recall memories in the language in which they originally occurred. The current study extends prior results with Russian-English bilingual adults (Marian & Neisser, 2000) to an Arabic-English bilingual immigrant sample, suggesting that the language-dependent memory effect is true across different bilingual populations and languages. In the current study, participants recalled significantly more memories that originally occurred in Arabic during the Arabic interview compared to the English interview, and significantly more English-language memories during the English interview compared to the Arabic interview. In contrast, the number of mixed-language memories did not significantly differ between sessions, consistent with prior work (Marian & Neisser, 2000) finding that memories encoded in a bilingual context are accessible from either language and are therefore not as strongly bound to a single language context. These results are consistent with the principle that memory retrieval is most effective when the conditions at retrieval match the conditions at encoding (Marian & Kaushanskaya, 2011; Marian & Neisser, 2000). The interview language serves as a powerful contextual signal that activates

memories encoded within the corresponding linguistic and cultural environment, consistent with the broader literature on context-dependent memory and language-dependent memory (Marian & Kaushanskaya, 2011; Marian & Neisser, 2000; Schrauf, 2000).

Additionally, participants responded significantly faster when the interview language matched the language of the memory. This effect was consistent whether code-switched memories were excluded or included in the comparison, supporting previous findings that language-congruent retrieval facilitates faster autobiographical memory access (Marian & Neisser, 2000). The current study provides further support for the idea that matching the linguistic context at encoding and retrieval reduces the cognitive effort required to access autobiographical memories (Marian & Kaushanskaya, 2011). Taken together, the latency and match proportion findings suggest that the language of the interview actively shapes the accessibility of autobiographical memories in a meaningful and statistically reliable way, even within a relatively small sample (Marian & Kaushanskaya, 2011).

Narrative Detail and the Role of Language Match

While the overall effect of language-dependent memory was supported, the prediction that participants would narrate in greater detail when interview language matched the language of the memory only received partial support. When code-switched memories were included in the comparison, participants produced significantly more words (measured by LIWC-22 word count) in matched compared to non-matched narratives. However, no significant differences were found for narrative language (speaking duration), function word use, or big word use, regardless of whether code-switched memories were included or excluded.

These findings may reflect the multidimensional nature of "detail" in autobiographical narratives. Length, word count, function word density, and big word use each measure different aspects of narrative richness and are not necessarily correlated with one another. It is also possible that some of the null effects for narrative detail reflect limitations in statistical power given the small sample size (N = 20). With only 20 participants, the study may have been underpowered to detect smaller or more variable effects on detail measures. The significant word count effect remains meaningful, as it converges with the theoretical prediction that greater cognitive accessibility in a matched language condition allows speakers to produce more elaborated, information-rich narratives (Szoke et al., 2020; Marian & Kaushanskaya, 2011). At the same time, it is important to note that narrative length in seconds and LIWC word count, while often correlated, may diverge depending on how quickly participants spoke, how often they paused, and how structured their narratives were in a given language. This distinction could explain why the two measures yielded different results (Tausczik & Pennebaker, 2010).

As previously discussed, code-switched memories may be less closely associated with a single language, making them more difficult to retrieve with the same level of detail during recall (Marian & Neisser, 2000). Future research should examine this possibility more directly by comparing narrative detail separately across pure match, pure mismatch, and code-switched conditions.

Emotional Expression and Emotional Congruence

The current study also examined whether participants would express more negative affect and demonstrate greater emotional congruence when narrating memories in their first language. These effects were only observed for first-acquired language but not dominant language.

Participants showed significantly more LIWC-22 negative emotion in their first language narratives, consistent with the emotional resonance hypothesis, which proposes that the first language has stronger automatic emotional associations because it is acquired during early childhood in highly affective social contexts (Del Maschio et al., 2024; Liu et al., 2024; Pavlenko, 2012). The greater negative emotionality in L1 may also reflect the types of memories recalled in that language. For many Arabic-dominant participants who immigrated as young adults, memories recalled in Arabic may have included emotionally significant experiences from before immigration, such as childhood, family, or experiences of loss and transition (Pavlenko, 2012).

However, emotional congruence, defined as the proportion of memories whose emotional valence matched the valence of the cue word, did not differ by language dominance or order of acquisition. One possible explanation is that emotional congruence is influenced more by the emotional valence of the cue word than by the language in which it is presented. In other words, emotionally charged cue words may elicit emotionally congruent memories regardless of the language used during recall (Marian & Neisser, 2000; Pavlenko, 2012). It is also possible that the use of only emotionally charged cue words limited the ability to detect language differences, as participants may have recalled emotionally congruent memories at similarly high rates across both languages. Future research could examine this by including both emotionally charged and neutral cue words.

An interesting finding was that none of the effects were significant when examined by language dominance, whereas several significant effects emerged for first acquired language. This suggests that language acquisition may be more closely related to emotional memory than current language dominance. Many bilingual individuals become more dominant in their second

language over time, particularly after immigrating, while their first-acquired language remains the language in which many early emotional experiences occurred (Pavlenko, 2012; Marian & Kaushanskaya, 2011). As a result, examining first-acquired language may be especially important when studying emotional memory in bilinguals. Future research should carefully collect patient demographic information to examine effects of order of acquisition and language dominance, as this may influence the findings.

Linguistic Distancing in the Second Language

Emotionality as influenced by language choice was further examined in terms of emotional distancing, idealized language and dismissive language narrations, using the LIWC measures of Authenticity, Narrative Arc, and Analytic Thinking. Significant findings were found for first-acquired language but not dominant language. Participants showed significantly higher Authenticity scores in their first-acquired language than in their second language, suggesting that their first-language narratives were more genuine, personal, and emotionally unguarded, while their second-language narratives were more linguistically constructed (Byford, 2015; Kokaliari et al., 2013). This finding is consistent with clinical observations that bilingual clients are more likely to access deep emotional material when speaking in their first language, and L2 speech can function as a form of emotional distancing from difficult content (Byford, 2015; Kokaliari et al., 2013). It also aligns with Bailey and colleagues's (2020) finding that immigrant adolescents' trauma narratives in the second language were characterized by more idealistic and dismissive speech patterns compared to their L1 narratives.

Somewhat unexpectedly, Narrative Arc scores were found to be significantly higher in the second language than in the first language, indicating that participants structured their L2

narratives according to a more coherent, story-like arc compared to their L1 narratives. This finding is interesting because instead of implying emotional distancing in L1, it could mean that participants narrated their memories in a more idealized and structured way in their L2, consistent with the "idealized" and "dismissive" speech patterns described in the literature (Bailey et al., 2020). Narratives that followed a clearer story structure may have reflected greater cognitive organization rather than greater emotional engagement (Tausczik & Pennebaker, 2010). This interpretation is consistent with the hypothesis that recalling memories in a second language promotes emotional distancing.

Analytic Thinking scores were higher in the participant's first-acquired and dominant language compared to the second-acquired and non-dominant language, although this difference was not statistically significant. This finding was opposite to what was expected, as it was hypothesized that participants would use more analytic language when narrating memories in their second and/or non-dominant language. One possible explanation is that Analytic scores are influenced by language proficiency (Tausczik & Pennebaker, 2010). Participants may have been better able to express themselves using more complex language in their first or dominant language because they were more proficient in it (Marian et al., 2007). If so, Analytic Thinking may reflect linguistic proficiency as much as emotional distancing. Future research should examine this further by including more comprehensive measures of language proficiency.

Language, Emotionality, and Psychological Well-Being

The relationship between emotional intensity in the dominant language and trauma-related symptoms was one of the strongest findings. Greater emotional intensity during recall in the dominant language relative to non-dominant language significantly predicted higher IES-R

scores, accounting for approximately 25% of the variance in trauma-related symptom severity. This finding suggests that participants who experienced stronger emotional reactions when recalling memories in their first-acquired language also reported greater trauma-related symptoms. For many participants, their first-acquired language was also the language in which many emotionally significant experiences before immigration occurred (Pavlenko, 2012). As a result, recalling memories in their first-acquired language may have provided greater access to these emotionally significant experiences than recalling them in their second language (Marian & Kaushanskaya, 2011)..

These findings may also have important clinical implications. Therapists working with bilingual clients may benefit from considering the language in which clients choose to discuss emotionally significant experiences, as the findings of the present study suggest that language can influence emotional expression during autobiographical memory recall. A client who appears emotionally detached when discussing a traumatic event in their second language may not necessarily be experiencing less distress. Instead, they may be recalling the memory in a language that creates greater emotional distance from the experience (Byford, 2015; Ivaz et al., 2016). Allowing clients to narrate memories in their first-acquired language, or to switch between languages when appropriate, may provide a more complete understanding of their emotional experiences and facilitate deeper emotional processing during trauma-focused therapy (Szoke et al., 2020).

When recall in the first-acquired language was examined, a similar pattern was observed; however, the relationship did not reach statistical significance. Although the findings were in the predicted direction, additional research with larger samples is needed to determine whether this relationship is consistent across different definitions of first-acquired language.

The third larger question examining language and memory in relation to different psychological outcomes showed mixed results. Differences in LIWC Authenticity and Analytic Thinking between L1 and L2 did not significantly predict SOS-10 scores when examined by non-dominant or second-acquired language. One possible explanation is that the SOS-10, which measures general psychological functioning over the past week, may not be sensitive enough to capture the relationship between language use and emotional distancing (Byford, 2015; Pavlenko, 2012). Future research could examine this relationship using measures of emotional regulation, resilience, or acculturation stress.

However, participants who produced relatively longer narratives in their dominant language reported higher self-esteem, with narrative length accounting for approximately 33% of the variance in RSES scores. One possible explanation is that individuals with higher self-esteem feel more comfortable expressing themselves in their dominant language, resulting in longer and more detailed narratives. Additionally, being able to describe personal experiences in greater detail may contribute to a more coherent sense of self, which has been linked to self-esteem and identity (Marian & Kaushanskaya, 2011; Smith et al., 2023).

This relationship was not found when first language was defined according to language acquisition. In other words, producing relatively longer narratives in one's first-acquired language, compared to one's second-acquired language, was not associated with higher self-esteem. This difference may reflect the fact that a participant's first-acquired language is not always the language in which they currently feel most comfortable expressing themselves. As a result, narrative length may be more closely related to current language dominance than to the order in which languages were acquired.

The Importance of How L1 is Defined

An important pattern across hypotheses was that significant effects consistently appeared when language effects were examined in terms of first-acquired language rather than by language dominance. This pattern highlights an important consideration for bilingual research by implying that the way in which L1 and L2 are operationalized can meaningfully change the pattern of results (Pavlenko, 2012; Marian & Kaushanskaya, 2011). It also suggests that different definitions may be more appropriate depending on what is being studied. Language acquisition seemed to be more closely related to emotional memory and emotional expression, whereas language dominance was more closely related to narrative production and self-esteem, consistent with previous work demonstrating that first-acquired language and dominant language capture distinct aspects of bilingual experience (Marian et al., 2007). Researchers should therefore be clear about how they define L1 and consider examining both order of acquisition and language dominance when studying bilingual populations.

Strengths and Limitations

The present study has several strengths. First, it replicates the language-dependent memory paradigm and effect (Marian & Neisser, 2000) in an Arabic-English bilingual immigrant sample, extending work on the language-dependent memory effect in a population that has received little attention in previous research. Second, the use of both LIWC-22 and self-report measures allowed for the examination of emotional expression and narrative characteristics from multiple perspectives. Third, the inclusion of measures of trauma symptoms, psychological functioning, and self-esteem adds to our knowledge on how language-related differences in memory recall relate to psychological well-being. Finally, the study adds to our understanding of

bilingual language processing more generally. Bilinguals who speak the same languages do not have the same language background and this study adds support to the importance of examining both order of acquisition and language dominance in individuals to gain a more comprehensive understanding of bilingual memory and emotional processing.

Several limitations should also be considered when interpreting the findings. First, the sample size was relatively small ($N = 20$), which limited statistical power and may have contributed to some findings not reaching statistical significance. This number was selected to replicate prior work on language-dependent memory following their methodology, but it did not allow examination of individual narratives as independent units, as some participants provided very brief responses to certain cue words. As a result, narratives had to be aggregated at the participant level rather than analyzed individually, limiting the level of detail that could be examined. Future research should recruit larger samples, as well as consider using procedures that encourage longer narrative responses to allow each memory to be analyzed independently.

A second limitation was the translation of Arabic narratives into English before LIWC-22 analysis. Because a validated Arabic LIWC dictionary is not currently available, all Arabic transcripts were translated into English and reviewed by the researcher before analysis. Although this approach was necessary, some linguistic and emotional nuances may have been lost during translation, which could have influenced the LIWC results. Future research would benefit from validated Arabic text analysis tools that allow narratives to be analyzed in their original language.

A third limitation is that memory language, emotional valence, and emotional intensity were based on participants' self-reports. Although this followed the prior established paradigm for studying language-dependent memory (Marian & Neisser, 2000), participants may not have

accurately remembered the original language or emotional qualities of every memory. Future studies could supplement self-report with independent coding of memory language based on contextual information within the narratives.

Another limitation of the current study is using self-report for assessment of language proficiency. Language proficiency was assessed using the LEAP-Q, a widely used and validated measure of bilingual language experience (Marian et al., 2007), however, self-reported proficiency may not fully capture participants' actual language abilities and was not used for examination of the study hypotheses. Future studies on the current questions should examine language proficiency effects, supplementing self-report measures with standardized language proficiency assessments.

Finally, participants were primarily young adults in college or had strong connections to community organizations, who scored highly on the measure of well-being and self-esteem. The current findings may not generalize to older bilingual adults, individuals with different immigration experiences, individuals from different SES backgrounds or with less support, individuals with lower well-being or self-esteem scores, or bilinguals and multilinguals from other language and cultural backgrounds. Future research should examine language and memory in more diverse populations. Additionally, the participant’s country of origin and the country they immigrated from was not controlled for in the current study. This is a factor that future studies should control for, as it likely contributed to some of the differences in the participant’s acquisition, dominance, and proficiency in both languages,

Clinical Implications

Despite its limitations, the present study has important clinical implications for work with bilingual clients. The findings suggest that the language used to recall emotionally significant memories may influence how those memories are experienced and expressed. As a result, language preferences when working with bilingual clients and understanding the possible influence of language choice on emotional expression during therapy may be beneficial for therapists to consider.

The finding that greater emotional intensity in L1 was associated with higher trauma symptom severity also has important clinical implications. Clients may express emotions differently depending on the language they use to discuss traumatic experiences. An important aspect of treating PTSD is to allow the client to express and experience the intense emotions that they experienced during the traumatic event which may happen more deeply in the first-acquired language. However, creating greater emotional distance from the experience by recalling memories in a second language may provide benefit, as well (Byford, 2015; Ivaz et al., 2016). Therefore, allowing clients to narrate memories in their preferred language, or even switch between languages when appropriate, may facilitate deeper emotional processing during trauma-focused therapy (Szoke et al., 2020).

Finally, the relationship between narrative length and self-esteem suggests that language may also influence how comfortably bilinguals express themselves. Some clients may be better able to describe their experiences and emotions in one language than another, depending on first-learned versus their dominant language. Recognizing this during assessment and treatment may help therapists gain a more complete understanding of their clients' experiences and facilitate a stronger therapeutic relationship.

Future Directions

Future research should replicate the present findings using larger and more diverse bilingual samples to improve statistical power and examine whether these findings generalize across different language pairs and cultural backgrounds. Studies should also investigate how factors such as age of immigration, years since immigration, language proficiency, and language dominance influence language-dependent memory, emotional expression, and narrative production.

Future research conducted in clinical settings would further strengthen the implications of the present findings. Examining how bilingual clients and therapists use language throughout the course of therapy may provide a better understanding of how language influences emotional processing and treatment outcomes. Future studies could also examine whether bilingual clients express themselves more openly or provide more detailed narratives when speaking in their dominant language, and whether allowing clients to use their dominant language or switch between languages improves emotional expression, therapeutic engagement, or treatment outcomes. Such findings could help therapists better understand how language preference and language dominance shape the therapeutic process. Finally, the development of validated Arabic-language text analysis tools would allow future studies to analyze Arabic narratives directly without relying on translated transcripts.

Chapter Five Conclusion

The present study provides evidence that language influences how bilingual individuals recall and narrate autobiographical memories. Participants were more likely to recall memories in the language in which they originally occurred and retrieved those memories more quickly

when the interview language matched the language of the memory. Emotional expression and narrative authenticity were greater for first-acquired language, whereas narrative length was more strongly related to language dominance. In addition, greater emotional intensity during first-language recall was associated with higher trauma symptom severity. Together, these findings highlight the importance of considering an individual's language background when studying autobiographical memory and trauma when working with bilingual clients in clinical settings. They also demonstrate that order of acquisition and language dominance meaningfully influence the interpretation of findings in bilingual memory research.

References

Aafjes-van Doorn, K., Porcerelli, J., & Müller-Frommeyer, L. C. (2020). Language style matching in psychotherapy: An implicit aspect of alliance. *Journal of Counseling Psychology, 67*(4), 509–522. https://doi.org/10.1037/cou0000433

Al-Mahroos, Z., & Di Braccio, M. (2022). Language as power in the therapy room: A study of bilingual (Arabic–English) therapists' experiences. *Counselling and Psychotherapy Research*, *24*(1), 106–118. https://doi.org/10.1002/capr.12608

Bager-Charleson, S., Dewaele, J.-M. D., Costa, B., & Kasap, Z. (2017). A multilingual outlook: Can awareness-raising about multilingualism affect therapists' practice? A mixed-method evaluation. *Language and Psychoanalysis*, *6*(2), 56–75. https://doi.org/10.7565/landp.v6i2.1572

Bailey, C., McIntyre, E., Arreola, A., & Venta, A. (2020). What are we missing? How language impacts trauma narratives. *Journal of Child & Adolescent Trauma*, *13*(2), 153-161. https://doi.org/10.1007/s40653-019-00263-3

Bilgin, E., Adıgüzel, Z., Göksun, T., & Gülgöz, S. (2023). The cost of changing language context: The language-dependent recall of fictional stories. *Memory & Cognition*, *51*(7), 1607–1622. https://doi.org/10.3758/s13421-023-01415-5

Blais, M. A., Lenderking, W. R., Baer, L., deLorell, A., Peets, K., Leahy, L., & Burns, C. (1999). Development and initial validation of a brief mental health outcome measure. *Journal of Personality Assessment*, *73*(3), 359–373. https://doi.org/10.1207/s15327752jpa7303_5

Boyd, R. L., Ashokkumar, A., Seraj, S., & Pennebaker, J. W. (2022). *The development and psychometric properties of LIWC-22* (Unpublished Manual). University of Texas at Austin. Retrieved from https://www.liwc.app

Bradley, M. M., & Lang, P. J. (1999). *Affective norms for English words (ANEW): Instructional manual for affective ratings.* Technical Report C-1. The Center for Research in Psychophysiology, University of Florida.

Bustamante, L. H. U., Cerqueira, R. O., Leclerc, E., & Brietzke, E. (2017). Stress, trauma, and posttraumatic stress disorder in migrants: A comprehensive review. *Revista Brasileira de Psiquiatria*, *40*(2), 220–225. https://doi.org/10.1590/1516-4446-2017-2290

Byford, A. (2015). Lost and gained in translation: The impact of bilingual clients' choice of language in psychotherapy. *British Journal of Psychotherapy*, *31*(3), 333-347. https://doi.org/10.1111/bjp.12148

Champoux-Larsson, M.-F., & Nook, E. C. (2024). How first- and second-language emotion words influence emotion perception in Swedish–English bilinguals. *Bilingualism: Language and Cognition*, 1–11. https://doi.org/10.1017/s1366728923000998

Chen, P., Lin, J., Chen, B., Lu, C., & Guo, T. (2015). Processing emotional words in two languages with one brain: Erp and fmri evidence from Chinese–english bilinguals. *Cortex*, *71*, 34–48. https://doi.org/10.1016/j.cortex.2015.06.002

Costa, B., & Dewaele, J. (2018). The talking cure—building the core skills and the confidence of counsellors and psychotherapists to work effectively with multilingual patients through training and supervision. *Counselling and Psychotherapy Research*, *19*(3), 231–240. https://doi.org/10.1002/capr.12187

Del Maschio, N., Sulpizio, S., Bellini, C., Del Mauro, G., Giannachi, M., Buga, D., Fedeli, D., Perani, D., & Abutalebi, J. (2024). Neurocognitive mechanisms of emotional interference in native and foreign languages: Evidence from proficient bilinguals. *Frontiers in Behavioral Neuroscience*, *18*. https://doi.org/10.3389/fnbeh.2024.1392005

Demir, M. (2023). *The varieties of effects of using a later-learned language in psychotherapy: a psychoanalytic-linguistic investigation with particular reference to involuntarily dislocated persons* (Doctoral dissertation, University of Essex).

Dewaele, J. M., & Costa, B. (2013). Multilingual clients' experience of psychotherapy. *Language and Psychoanalysis*, *2*(2), 31-50. https://doi.org/10.7565/landp.2013.005

El-Dakhs, D. A., & Altarriba, J. (2019). How do emotion word type and valence influence language processing? the case of Arabic–english bilinguals. *Journal of Psycholinguistic Research*, *48*(5), 1063–1085. https://doi.org/10.1007/s10936-019-09647-w

El-Dakhs, D. A., Ahmed, M. M., Altarriba, J., & Sonbul, S. (2024). Differential emotional expression in autobiographical narratives: The case of arabic–english bilinguals. *International Journal of Bilingualism*, *28*(5), 962–979. https://doi.org/10.1177/13670069231201173

Foa, E. B., & Kozak, M. J. (1986). Emotional processing of fear: Exposure to corrective information. *Psychological Bulletin*, *99*(1), 20–35. https://doi.org/10.1037//0033-2909.99.1.20

Forray, A. I., Oltean, O., Hanft-Robert, S., Madzamba, R., Liem, A., Schouten, B., Anthonissen, C., Swartz, L., Cherecheș, R. M., Higgen, S., Hall, B. J., & Mösko, M. (2024). Uncovering multi-level mental healthcare barriers for migrants: A qualitative analysis across China, Germany, Netherlands, Romania, and South Africa. *BMC Public Health*, *24*(1). https://doi.org/10.1186/s12889-024-19046-z

Griner, D., & Smith, T. B. (2006). Culturally adapted mental health intervention: A meta-analytic review. *Psychotherapy: Theory, Research, Practice, Training*, *43*(4), 531–548. https://doi.org/10.1037/0033-3204.43.4.531

Guazzo, G. M. (2024). The Role of Memory in Psychotherapeutic Treatment. *European Journal of Medical and Health Research*, *2*(4), 222-229. https://doi.org/10.59324/ejmhr.2024.2(4).29

Hayes, S. C., Strosahl, K. D., & Wilson, K. G. (2011). *Acceptance and commitment therapy: The process and practice of mindful change*. Guilford press.

Hmaidi, L. (2016). *The recall of culture - Specific emotionally charged words by Arabic/English bilingual students*(thesis).

Holmes, J. (1996). Psychotherapy and memory–an attachment perspective. *British Journal of Psychotherapy*, *13*(2), 204-218. https://doi.org/10.1111/j.1752-0118.1996.tb00877.x

Ivaz, L., Costa, A., & Duñabeitia, J. A. (2016). The emotional impact of being myself: Emotions and foreign-language processing. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *42*(3), 489–496. https://doi.org/10.1037/xlm0000179

Jansson, B., & Dylman, A. S. (2021). Reduced vividness of emotional memories following reactivation in a second language. *Cognition and Emotion*, *35*(6), 1222–1230. https://doi.org/10.1080/02699931.2021.1937948

Kokaliari, E., Catanzarite, G., & Berzoff, J. (2013). It is called a mother tongue for a reason: A qualitative study of Therapists' perspectives on bilingual psychotherapy—treatment implications. *Smith College Studies in Social Work*, *83*(1), 97–118. https://doi.org/10.1080/00377317.2013.747396

Lane, R. D., Ryan, L., Nadel, L., & Greenberg, L. (2014). Memory reconsolidation, emotional arousal, and the process of change in psychotherapy: New insights from brain science. *Behavioral and Brain Sciences*, *38*. https://doi.org/10.1017/s0140525x14000041

Liu, C., Jeong, H., Cui, H., Dewaele, J.-M., Okamoto, K., Suzuki, Y., & Sugiura, M. (2024). Effects of social interactions on the neural representation of emotional words in late bilinguals. *Language, Cognition and Neuroscience*, *39*(3), 383–399. https://doi.org/10.1080/23273798.2024.2307630

Madrid, P. A. (2001). *Bilingual code-switching (CS) as a mediator in the processing posttraumatic stress disorder (PTSD) traumatic memories (TM): A manual for therapists*. University of Hartford.

Marian, V. (2020). Language-dependent memory. In *Proceedings of the Twenty-first Annual Conference of the Cognitive Science Society* (pp. 355-360). Psychology Press. http://dx.doi.org/10.4324/9781410603494-67

Marian, V., Blumenfeld, H. K., & Kaushanskaya, M. (2007). The language experience and proficiency questionnaire (LEAP-Q): Assessing language profiles in Bilinguals and multilinguals. *Journal of Speech, Language, and Hearing Research*, *50*(4), 940–967. https://doi.org/10.1044/1092-4388(2007/067)

Marian, V., & Kaushanskaya, M. (2011). Language-dependent memory: Insights from bilingualism. In *Relations Between Language and Memory* (pp. 95-120). Sabest Saarbrucker. C. Zelinsky-Wibbelt (Ed.). Franfurt.

Marian, V., & Neisser, U. (2000). Language-dependent recall of autobiographical memories. *Journal of Experimental Psychology: General*, *129*(3), 361–368. https://doi.org/10.1037//0096-3445.129.3.361

Nijdam, M. J., de Vries, G. J., Gersons, B. P., & Olff, M. (2015). Response to psychotherapy for posttraumatic stress disorder: The role of pretreatment verbal memory performance. *The Journal of clinical psychiatry*, *76*(8), 18178. https://doi.org/10.4088/JCP.14m09438

Ortigosa-Beltrán, I., Jaén, I., & García-Palacios, A. (2023). *Processing Negative Autobiographical Memories in a Foreign Language*. https://doi.org/10.1101/2022.12.19.22283709

Pavlenko, A. (2005). *Emotions and multilingualism.* Cambridge University Press. https://doi.org/10.1017/CBO9780511584305

Pavlenko, A. (2012). Affective processing in bilingual speakers: Disembodied cognition? *International Journal of Psychology*, *47*(6), 405–428. https://doi.org/10.1080/00207594.2012.743665

Roger, E., Banjac, S., Thiebaut de Schotten, M., & Baciu, M. (2022). Missing links: The functional unification of language and memory (lUm). *Neuroscience & Biobehavioral Reviews*, *133*, 104489. https://doi.org/10.1016/j.neubiorev.2021.12.012

Rosenberg, M. (1965). Rosenberg self-Esteem Scale. *PsycTESTS Dataset*. https://doi.org/10.1037/t01038-000

Schwanberg, J. (2006). *Does language of retrieval affect the remembering of trauma?* (dissertation).

Sharif, H., & Mahmood, S. (2023). Emotional processing in bilinguals: A systematic review aimed at identifying future trends in neurolinguistics. *Humanities and Social Sciences Communications*, *10*(1). https://doi.org/10.1057/s41599-023-01926-1

Smith, M. L., Nordfelt, R., Daley, J., & D'Aniello, C. (2023). Not just semantics: A synthesis of narrative therapy and linguistic relativity as applied to Spanish-speaking bilingual clients. *Contemporary Family Therapy*, *46*(1), 100–111. https://doi.org/10.1007/s10591-023-09670-z

Szoke, D., Cummings, C., & Benuto, L. T. (2020). Exposure in an increasingly bilingual world: Native language exposure therapy with a non-language matched therapist. *Clinical Case Studies*, *19*(1), 51–61. https://doi.org/10.1177/1534650119886349

Tausczik, Y. R., & Pennebaker, J. W. (2009). The psychological meaning of words: LIWC and computerized text analysis methods. *Journal of Language and Social Psychology*, *29*(1), 24–54. https://doi.org/10.1177/0261927x09351676

Tehrani, N., & Vaughan, S. (2009). Lost in translation – using bilingual differences to increase emotional mastery following bullying. *Counselling and Psychotherapy Research*, *9*(1), 11–17. https://doi.org/10.1080/14733140802656131

Weiss, D. S., & Marmar, C. R. (1997). Impact of event scale--revised. *PsycTESTS Dataset*. https://doi.org/10.1037/t12199-000

Zasiekina, L. (2020). Trauma, rememory and language in Holodomor survivors' narratives. *Psycholinguistics*, *27*(1), 80-94. https://doi.org/10.31470/2309-1797-2020-27-1-80-94

Tables

Table 1 Emotional Valence of Cue Words

Positive	Negative
Party	Fear
Friend	Pain
Love	Failure
Laughter	Destruction
Home	Anger
Freedom	Danger
Family	Despair
Strength	Accident

Table 2 Cue Words and Translation

Set 1		Set 2	
English	**Arabic**	**English**	**Arabic**
Party	حفلة** / Hafla	Anger	غضب** / Ghadab
Fear	خوف* / Khawf	Home	بيت** / Bayt
Friend	صديق** / Sadeeq	Danger	خطر** / Khatar
Pain	وجع** / Waja'a	Freedom	حرية* / Huriya
Love	حب** / Hubb	Despair	يأس* / Yaas
Failure	فشل* / Fashal	Family	عائلة* / A'aila
Laughter	ضحك** / Dahik	Strength	قوة* / Quwwa
Destruction	دمار* / Damar	Accident	حادث* / Hadith

* Retrieved from El-Dakhs & Altarriba (2019) and translated by author for the current study.

** Retrieved from Hmaidi (2016) with translations.

Table 3 Paired-Samples t-tests Comparing Matched and Mismatched Memories (excluding code-switching)

Variable	**Match *M* *(SD)***	**Mismatch *M* (SD)**	***t*(19)**	**One-Sided *p***	**Two-sided *p***	**Hedge's *g***
Response Latency (seconds)	5.28 (2.54)	7.91 (6.74)	-1.88	.038	.076	-0.40
Narrative length (seconds)	27.02 (20.19)	30.85 (24.36)	-1.16	.129	.259	-.25
LIWC word count	653.95 (514.01)	476.85 (517.79)	1.64	.059	.118	.35
Function words (%)	61.14 (4.63)	62.31 (3.89)	-1.44	.083	.167	-.31
Big words (%)	13.58 (3.25)	12.58 (2.56)	1.35	.096	.193	.29

Table 4 Paired Samples t-test Comparing Matched and Mixed Memories including code-switching)

Variable	**Match *M* *(SD)***	**Mismatch *M* (SD)**	***t*(19)**	**One-Sided *p***	**Two-sided *p***	**Hedge's *g***
Response Latency (seconds)	5.28 (2.54)	7.60 (5.19)	-2.14	.023	0.46	-0.46
Narrative length (seconds)	27.02 (20.19)	30.44 (24.82)	-1.35	.097	.194	-.29
LIWC word count	653.95 (514.01)	425.43 (513.59)	2.04	.028	.055	.44
Function words (%)	61.14 (4.63)	62.74 (3.92)	-1.84	.041	.081	-.40
Big words (%)	13.58 (3.25)	12.92 (3.14)	1.02	.159	.319	.22

Table 5 Paired Samples t-test Examining Language-Dependent Memory Recall

Analysis	Arabic Session *M* (SD)	English Session *M* (SD)	*t*(19)	*p*	Hedges' *g*
Arabic memories	5.10 (1.99)	3.70 (1.75)	3.62	.002	.78
English memories	1.25 (1.33)	2.30 (1.87)	-2.93	.009	-.63
Code-switched memories	1.65 (1.57)	2.00 (1.49)	-.88	.390	-.61

Table 6 One Sample t-test Examining Language-Dependent Memory Recall

Variable	*M* (SD)	Test Value	*t*(19)	*p*	Hedges' *g*
Overall match proportion	.59 (.12)	.50	3.64	.002	.78

Table 7 Paired-Samples t-test Comparing Negative Affect and Emotional Congruence Between Narratives According to Dominance

Variable	L1 *M* (SD)	L2 *M* (SD)	*t*(19)	*p*	Hedges' *g*
Negative emotion	1.54 (.75)	1.75 (1.02)	-.74	.467	-.16
Negative tone	2.78 (1.18)	2.95 (1.51)	-.44	.665	-.09
Affect	6.12 (1.97)	6.21 (2.56)	-.12	.903	-.03
Emotional congruence (%)	.76 (.16)	.77 (.19)	-.11	.914	-.02
Negative valence (%)	.44 (.14)	.46 (.10)	-1.07	.297	-.23

Table 8 Paired-Samples t-test Comparing Negative Affect and Emotional Congruence Between Narratives According to Acquisition

Variable	L1 *M* (SD)	L2 *M* (SD)	*t*(19)	One-Sided *p*	Two-Sided *p*	Hedges' *g*
Negative emotion	1.91 (.78)	1.39 (.94)	1.96	.033	.065	.42
Negative tone	3.16 (1.21)	2.56 (1.43)	1.63	.060	.120	.35
Affect	6.71 (2.36)	5.61 (2.07)	1.52	.072	.144	.33
Emotional congruence (%)	.73 (.19)	.79 (.15)	-1.17	.128	.255	-.25
Negative valence (%)	.43 (.12)	.47 (.11)	-1.67	.055	.110	-.36

Table 9 Paired-Samples t-tests Comparing Linguistic Distancing Variables Between Narratives According to Dominance

Variable	**L1 *M* (SD)**	**L2 *M* (SD)**	***t*(19)**	***p***
Authenticity	92.94 (8.25)	91.96 (8.52)	.64	.527
Analytic Thinking	18.94 (12.61)	15.79 (9.06)	.82	.423
Narrative Arc	18.33 (18.13)	11.00 (18.26)	1.08	.296
Clout	24.76 (18.95)	28.20 (15.91)	-.90	.379
Tone	39.83 (11.00)	37.66 (11.75)	.57	.575
Positive tone	3.27 (1.23)	3.22 (1.69)	.09	.927
Positive valence	.39 (.12)	.36 (.16)	.53	.606
Positive emotion	1.22 (.75)	1.17 (1.05)	.16	.878

Table 10 Paired Samples t-tests Comparing Linguistic Distancing Variables Between Narratives According to Acquisition

Variable	**L1 *M* (SD)**	**L2 *M* (SD)**	***t*(19)**	**One-Sided *p***	**Two-Sided *p***	**Hedge's *g***
Authenticity	94.25 (7.87)	90.65 (8.51)	2.77	.006	.012	.59
Analytic Thinking	20.89 (12.61)	13.83 (7.82)	1.98	.031	.062	.43
Narrative Arc	5.45 (16.98)	23.89 (14.94)	-3.30	.002	.004	-.71
Clout	28.36 (18.82)	24.60 (16.03)	.99	.168	.336	.21
Tone	39.22 (11.76)	38.27 (11.07)	.25	.404	.808	.05
Positive tone	3.49 (1.66)	2.99 (1.22)	.99	.168	.337	.211
Positive valence	.37 (.16)	.40 (.13)	-.66	.257	.515	-.15

Variable	L1 *M* (SD)	L2 *M* (SD)	*t*(19)	One-Sided *p*	Two-Sided *p*	Hedge's *g*
Positive emotion	1.22 (.95)	1.13 (.87)	.24	.406	.813	.05

Table 11 Simple Linear Regression Predicting Trauma-Related Symptoms From Differences in Emotional Intensity Between Narratives According to Dominance

Predictor	β	*t*	*p*	95% CI
Emotional intensity difference	.503	2.47	.024	[1.06, 13.16]

Model Summary: $R^2 = .25$, $F(1,18) = 6.10$, $p = .024$

Table 12 Simple Linear Regression Predicting Trauma-Related Symptoms From Differences in Emotional Intensity Between Narratives According to Acquisition

Predictor	β	*t*	*p*	95% CI
Emotional intensity difference	.437	2.06	.054	[-.11, 10.95]

Model Summary: $R^2 = .19$, $F(1,18) = 4.24$, $p = .054$

Table 13 Multiple Regression Analysis Predicting Psychological Functioning From Linguistic Distancing Variables – According to Dominance

Predictor	β	*t*	*p*
Analytic difference	-.014	-.06	.952
Authenticity difference	.326	1.41	.178

Model Summary: $R^2 = .11$, $F(2,17) = .99$, $p = .390$

Table 14 Multiple Regression Analysis Predicting Psychological Functioning From Linguistic Distancing Variables – According to Acquisition

Predictor	β	*t*	*p*
Analytic difference	-.035	-.13	.897
Authenticity difference	.125	.47	.645

Model Summary: $R^2 = .01$, $F(2,17) = .11$, $p = .894$

Table 15 Simple Linear Regression Analyses Predicting Self-Esteem From Differences in Narrative Length According to Dominance

Predictor	β	*t*	*p*	95% CI
Narrative length difference	.578	2.92	.010	[.04, .27]

Model Summary: $R^2 = .33$, $F(1,17) = 8.52$, $p = .010$

Table 16 Simple Linear Regression Analyses Predicting Self-Esteem From Differences in Narrative Length According to Acquisition

Predictor	β	*t*	*p*
Narrative length difference	-.14	-.29	.776
Word count difference	.14	.29	.775

Model Summary: $R^2 = .01$, $F21,16) = 0.46$, $p = .956$

Appendix A: Verbal Instructions

The following includes all the verbal instructions given to the participants once they arrive at the lab.

Initial Instructions

Hi! My name is Zainah, I am going to be conducting the interviews with you today for our study. Thank you for taking the time to participate in this study.

This study focuses on storytelling in different languages and your narratives will be compared in Arabic and English. Because it may be hard to come up with multiple narratives, you will be given some words to prompt your responses. You will be asked to recall and share some personal memories based on the provided words. Please speak as naturally and personally as possible.

The interview will be divided into two parts, one fully in Arabic and the other fully in English. We are interested in how people express themselves in different languages, so please use only the language assigned to each session. So, during the Arabic interview, I will ask you to do your best to only speak in Arabic and same thing during the English interview.

The entire session will be audio recorded to help with analysis later. If at any point you feel uncomfortable, you may skip a question or stop the study.

Let's begin with the survey, please complete it on this computer.

First Session

Informed Consent

I would like to make sure that you agree to participating in this study and that you understand that all the information you provide in this study will be treated confidentially and that in any report on the results of this research your identity will remain anonymous. I also want to make sure you are aware that you are being audio recorded.

Do you consent to that?

Warm up Task

Now we'll begin with a warm-up task to help you get comfortable speaking in [Arabic/English]. I'd like you to divide your life into four stages based on your age, 0-8; 9-16; 17-now. Please briefly share one memory from each stage. Please make sure it's a specific memory, whatever memory that first comes to mind. Describe that memory to me. It doesn't need to be emotional or important, just something that stands out to you.

This will help get you thinking in [Arabic/English], so please do not switch to the other language during this part either.

Cue Word Instructions

Next, I will say one word at a time. Each word is meant to help you remember something personal from your life. When you hear the word, take a moment and then begin speaking about the first memory that comes to mind. Please tell a brief story of specific events from your life. Please begin speaking as soon as you can, because we are measuring how long it takes to respond, and how long you talk.

Remember, stick to the assigned language during the whole session, and just speak naturally as you tell your story. Let's begin.

Second Session

Informed Consent

This is another reminder before we start the second session. I would like to make sure that you agree to participating in this study and that you understand that all the information you provide in this study will be treated confidentially and that in any report on the results of this research your

identity will remain anonymous. I also want to make sure you are aware that you are being audio recorded.

Do you consent to that?

Warm Up Task

Before we begin this session in [Arabic/English], we'll start with a short warm-up task. Please tell me about your immigration experience to the United States. Again, this is just to help you shift into this language and get comfortable. As before, please speak only in [Arabic/English] during this task.

Cue Word Instructions

Next, I will say one word at a time. Each word is meant to help you remember something personal from your life. When you hear the word, take a moment and then begin speaking about the first memory that comes to mind. Please tell a brief story of specific events from your life. Please begin speaking as soon as you can, because we are measuring how long it takes to respond, and how long you talk.

Remember, stick to the assigned language during the whole session, and just speak naturally as you tell your story. Let's begin.

Post-Narrative Reflection (Coding Sheet Completion)

Now that you've shared your memories, I'll ask you a few follow-up questions for each one.

Final Questionnaire Instructions

Thank you for completing the interviews. Now we'll ask you to complete a few more short surveys on the computer.

Please answer as honestly as you can. When you're finished, I'll come back to debrief you.

Debriefing Instructions

Thank you for participating. I'd now like to share the real purpose of the study. While we told you it was about storytelling, we are actually interested in how language influences the emotional expression and memory recall of bilingual individuals.

We didn't tell you this at the start to make sure your answers weren't biased. Your responses will remain confidential, and you have the right to withdraw your data at any time.

If any part of the study brought up distressing feelings or memories, please let me know—we can refer you to support resources if needed. Thank you again for your time.

Appendix B: Participant Order Log

Participant #	Participant #	1st session set	2nd session set
1	1-12AE	Set 1-Arabic	Set 2-English
2	2-12EA	Set 1-English	Set 2-Arabic
3	3-21AE	Set 2-Arabic	Set 1-English
4	4-21EA	Set 2-English	Set 1-Arabic
5	5-12AE	Set 1-Arabic	Set 2-English
6	6-12EA	Set 1-English	Set 2-Arabic
7	7-21AE	Set 2-Arabic	Set 1-English
8	8-21EA	Set 2-English	Set 1-Arabic
9	9-12AE	Set 1-Arabic	Set 2-English
10	10-12EA	Set 1-English	Set 2-Arabic
11	11-21AE	Set 2-Arabic	Set 1-English
12	12-21EA	Set 2-English	Set 1-Arabic
13	13-12AE	Set 1-Arabic	Set 2-English
14	14-12EA	Set 1-English	Set 2-Arabic
15	15-21AE	Set 2-Arabic	Set 1-English
16	16-21EA	Set 2-English	Set 1-Arabic
17	17-12AE	Set 1-Arabic	Set 2-English
18	18-12EA	Set 1-English	Set 2-Arabic
19	19-21AE	Set 2-Arabic	Set 1-English
20	20-21EA	Set 2-English	Set 1-Arabic

Appendix C: Memory Coding Sheet

Participant ID: _____ **Memory #:** ___ **Language**: A/E **Cue Word**: _____

A. MEMORY DESCRIPTION

Short Title/Label: _____

B. CONTEXTUAL INFORMATION

Item	Response
Language spoken during the event	Arabic / English / Both / Other: _____
Language spoken by others during event	Arabic / English / Both / Other: _____
Estimated age at time of event	_____ years old
Location of the memory	Home/School/Friend's House/Other: _____

Notes:_____

_____

_____

C. SUBJECTIVE RATINGS (Circle or fill in numeric scale)

Item	Scale	Score
Emotional valence	Positive / Negative / Neutral	_____
Emotional intensity	1 (very low) – 10 (very high)	_____
Vividness of memory	1 (very vague) – 10 (very vivid)	_____

Notes:_____

_____

_____

D. OBSERVER NOTES

Fidgeting/Squirming/Hand Gestures Yes/No _____

Other:

_____

_____

_____

Appendix D: Informed Consent Psychology Subject Pool

University of Michigan – Dearborn
Psychology Subject Pool Research Consent

BILINGUAL NARRATIVES

Principal Investigator: Zainah Al-Jundi, MS in Psychology, Department of Behavioral Sciences, University of Michigan - Dearborn
Faculty Advisor: Nitya Sethuraman, PhD, Department of Behavioral Sciences;
Caleb Siefert, PhD, Department of Behavioral Sciences

The psychology faculty considers participation in experimental research by subjects to be an educational experience for the students as well as a most important service to the research of the University. This research project has been reviewed by the Health Sciences and Behavioral Sciences Institutional Review Board (IRB-HSBS) and has been determined to be Exempt from IRB oversight.
Participation is voluntary, if you choose not to participate as a research subject you may participate in another research related activity at no expense to your academic record or standing. The purpose of today's experiment is to investigate differences in storytelling and compare narratives in Arabic and English.

Important Information about the Research Study

If you agree to be part of the research you will be asked to complete a brief online survey about your language background, age, and immigration experience. Then, you will take part in two individual storytelling parts—one in Arabic and one in English—in the psychology lab. First, you will complete a short warm-up task to help you feel comfortable speaking in that language. Then, in each part of the session, you will respond to eight cue words by recalling and describing a personal memory in the assigned language. Your voice will be audio-recorded, and we will measure how quickly you respond after the cue word is given. After sharing all your memories, you will be asked a few questions about each memory. Finally, you will complete three short online surveys. The entire process will take approximately 90 minutes.

The study will have no direct benefits for you. However, others may benefit from the knowledge gained from this study. With your participation, we will better understand an important part of language that has been under-researched.

There are minimal risks to you as a participant in the following study:

- You may experience some discomfort after remembering certain negative memories

- The researchers will try to minimize these risks by terminated the tasks immediately if you are too uncomfortable and wish to stop. Psychological risks will also be mitigated by providing you with counseling resources.

- Regarding the interview and surveys at the end of each text: You do not have to answer any questions you do not want to answer.

- Because this study collects information about you, the primary risk of this research is a loss of confidentiality. See Section 8 of this document for more information on how the study team will protect your confidentiality and privacy.

Compensation

As a part of your participation in an Introductory Psychology course at the University of Michigan- Dearborn, you agree to serve as a research subject for this experiment. You will receive 1.5 subject pool credits for your participation in today's study. You may withdraw at any time from today's study without penalty or loss of research participation credit.

Participating in this study is completely voluntary. Even if you decide to participate now, you may change your mind and stop at any time. You may choose not to answer any survey questions or continue with the interview for any reason.

Data Management & Security
The data will not be made available to other researchers for other studies following the completion of this research study and will not contain any information that could identify you.

If you have questions about this research study, you may contact the researchers listed below:

Principal Investigator: Zainah Al-Jundi
Email: zainahaj@umich.edu
Phone: (947)-275-7809

Faculty Advisor: Dr. Nitya Sethuraman
Email: nitya@umich.edu
Phone: (313)-593-5520

Faculty Advisor: Dr. Caleb Siefert
Email: csiefert@umich.edu

The University of Michigan IRB-HSBS has determined that this study is exempt from IRB oversight.

☐ *I confirm that I am 18 years old or older*

☐ *I consent to participate in the study.*

Appendix E: Informed Consent External

University of Michigan – Dearborn
Research Consent

BILINGUAL NARRATIVES

Principal Investigator: Zainah Al-Jundi, MS in Psychology, Department of Behavioral Sciences, University of Michigan - Dearborn
Faculty Advisor: Nitya Sethuraman, PhD, Department of Behavioral Sciences;
Caleb Siefert, PhD, Department of Behavioral Sciences

The psychology faculty considers participation in experimental research by subjects to be an educational experience for the students as well as a most important service to the research of the University. This research project has been reviewed by the Health Sciences and Behavioral Sciences Institutional Review Board (IRB-HSBS) and has been determined to be Exempt from IRB oversight.
Participation is voluntary, if you choose not to participate as a research subject you may participate in another research related activity at no expense to your academic record or standing.
The purpose of today's experiment is to investigate differences in storytelling and compare narratives in Arabic and English.

Important Information about the Research Study

If you agree to be part of the research you will be asked to complete a brief online survey about your language background, age, and immigration experience. Then, you will take part in two individual storytelling parts—one in Arabic and one in English—in the psychology lab. First, you will complete a short warm-up task to help you feel comfortable speaking in that language. Then, in each part of the session, you will respond to eight cue words by recalling and describing a personal memory in the assigned language. Your voice will be audio-recorded, and we will measure how quickly you respond after the cue word is given. After sharing all your memories, you will be asked a few questions about each memory. Finally, you will complete three short online surveys. The entire process will take approximately 90 minutes.

The study will have no direct benefits for you. However, others may benefit from the knowledge gained from this study. With your participation, we will better understand an important part of language that has been under-researched.

There are minimal risks to you as a participant in the following study:

- You may experience some discomfort after remembering certain negative memories

- The researchers will try to minimize these risks by terminated the tasks immediately if you are too uncomfortable and wish to stop. Psychological risks will also be mitigated by providing you with counseling resources.

- Regarding the interview and surveys at the end of each text: You do not have to answer any questions you do not want to answer.

- Because this study collects information about you, the primary risk of this research is a loss of confidentiality. See Section 8 of this document for more information on how the study team will protect your confidentiality and privacy.

Compensation

You will receive $50 as compensation for your participation. You may withdraw at any time from today's study without penalty or loss of compensation.

Participating in this study is completely voluntary. Even if you decide to participate now, you may change your mind and stop at any time. You may choose not to answer any survey questions or continue with the interview for any reason.

Data Management & Security
The data will not be made available to other researchers for other studies following the completion of this research study and will not contain any information that could identify you.

If you have questions about this research study, you may contact the researchers listed below:

Principal Investigator: Zainah Al-Jundi
Email: zainahaj@umich.edu
Phone: (947)-275-7809

Faculty Advisor: Dr. Nitya Sethuraman
Email: nitya@umich.edu
Phone: (313)-593-5520

Faculty Advisor: Dr. Caleb Siefert
Email: csiefert@umich.edu

The University of Michigan IRB-HSBS has determined that this study is exempt from IRB oversight.

☐ *I confirm that I am 18 years old or older*

☐ *I consent to participate in the study.*

Appendix F: Consent to Record Audio

I permit the UM-Dearborn to record a photographic image and/or audio or video of me for educational, academic, or research purposes. If the faculty or staff of the University judges that education or research may benefit from the use of the photographs and/or recordings, the University may publish or sell (not for profit) them for academic purposes, or use them in any other professional manner that the University believes is proper, including, but not limited to: print publications, video streaming on U-M websites, podcasting, and broadcast media.

I understand that the pictures and recordings belong to the University, and I will not receive payment or any other compensation in connection with the pictures and recordings.

I have had a chance to discuss this form with the University of Michigan staff and have received complete answers to all my questions.

I release the UM-Dearborn from any and all liability that may or could arise from the taking or use of the pictures.

Signature: _____Date: _____

Appendix G: Flyer

