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Culture and language influence how Hispanics/Latinos in the U.S. think about themselves through time

Alicia Camuy
aliciacamuy@gmail.com

Trinity College
HARTFORD CONNECTICUT

TRINITY COLLEGE

CULTURE AND LANGUAGE INFLUENCE HOW HISPANICS/LATINOS IN
THE U.S. THINK ABOUT THEMSELVES THROUGH TIME.

BY

Alicia Maria Camuy

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Alicia Maria Camuy

Honors Thesis Committee

Approved:

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Sarah A. Raskin, Thesis Advisor

_____

Sally Bernardina Seraphin, Thesis Committee

_____

Sarah A. Raskin, Director, Neuroscience Program

Date: _____

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Abstract

Culture has been implicated in episodic memory, but this has not been explored in episodic future thought. Episodic information helps to form an identity. Thus, this is an exploratory study to identify unique ways in which Spanish-English Hispanic/Latino populations remember and project to the future, perceive themselves over time, and perceive the passage of time. Participants (n = 50) were healthy bilingual Hispanics/Latinos living in the U.S. tested over Zoom. Materials included background information, an acculturation scale, Temporal Focus Scale (TFS), and Thinking About Life Experiences (TALE) Scale. A time estimation measure and Pre- and Re-experiencing Mental Events (PRIME) task were created for this study. Linear regressions were used to analyze the predictive value of culture, and language variables for mental time travel measures. Culture of origin might predict both past and future focus factor because of traditions continuing from the past and hope for socioeconomic progress in the future. Years living in the U.S. and first language influence collectivism in past and future projections. Spanish-speakers living the U.S could feel solidarity with Hispanic/Latino communities. U.S. cultural identification could predict time estimation because internal time passes faster than actual time due to the fast pace of life in the U.S.

Introduction

Defining Episodic Future Thought

A fascinating aspect of the human experience is the ability to imagine ourselves outside of our immediate surroundings in the present into faraway places and infinite standpoints in time. This process has been called mental time travel, and no, it is not science fiction. Episodic future thought (EFT) was first defined by Atance and O'Neill in 2001 as, "a projection of the self into the future to pre-experience an event" (pp. 533). This emerging concept is thought to be the reciprocal of episodic memory (EM), which has been clearly defined and thoroughly studied for decades (Atance & O'Neill, 2001). Indeed, EFT has been shown to rely on EM as a scaffold for the construction of a mental experience (D'Argembeau & Van der Linden, 2012; Schater et al., 2017; Szpunar, 2010). Tulving (2001) developed the theoretical model of EM that inspired Atance and O'Neill's EFT definition by separating semantic memory from EM by defining EM as the function that allows us to travel back to our memories of personal experiences to re-experience those events. Tulving then ties in autonoetic consciousness, the process in which one could be aware and mentally represent subjective experiences of the past, present, and future, and thus experience mental time travel, which can be combined with memories for the re-experience of mental events. Atance

and O'Neill (2001) then apply this mechanism to EFT in combination with other higher-order processes to pre-experience mental events.

Tulving's concept of autonoetic consciousness is presumed to be mediated by the prefrontal cortex, a locus of higher order cognition (Wheeler et al., 1997). More recently, fMRI findings have suggested that EFT is related to higher order cognitive processes since they occupy similar regions of the brain. EFT has neural correlates within two brain networks: the default mode network and the frontoparietal control network (Schater et al., 2017). Brain regions specifically associated with EFT include the medial temporal lobe, posterior cingulate cortex, medial prefrontal cortex, left posterior inferior parietal lobe, and posterior dorsolateral prefrontal cortex (Schater et al., 2017). There has been shown to be neural overlap for past and future events in regions associated with autobiographical memory, the frontopolar and inferior left medial prefrontal cortex, left temporal pole and middle temporal gyrus, left hippocampus and bilateral parahippocampal gyrus, bilateral posterior cingulate/retrosplenial regions, left precuneus, bilateral inferior parietal lobule, and cerebellum (Addis et al., 2007). Addis and colleagues also found various areas involved in future constructions but not past reconstructions including the frontopolar aspect of the right medial prefrontal cortex and the right hippocampus (2007). D'Argembeau and Salmon noted that several studies have linked the medial prefrontal cortex, medial and lateral temporal cortices, posterior cingulate cortex, and the

inferior parietal lobe to episodic self-referential thinking (2012). EFT may be specific to humans due to a larger prefrontal cortex which is associated with episodic memory (Suddendorf & Corballis, 2007). In addition to self-referential thinking, other relevant processes related to these regions include decision making, temporal discounting, emotional regulation, prospective memory, creativity, and identity (Schater et al., 2017).

The function of EFT from a cognitive domain perspective has been theorized as including the following: developing a plan, making predictions, attaining a goal, decision making, and anticipating an event (Atance & O'Neill, 2001). It is believed that there is a top-down mechanism of future thought that starts with memory and ends in a response, rather than starting with a stimuli and ending with an action, and this allows thought beyond the present (Suddendorf & Corballis, 2007). Testing for episodic memory is inherently dependent on language to explain details, which is why it is difficult to administer to other animals, and this suggests a connection between evolution of language and episodic memory and future thought (Bar, 2011). Development of the human race has been at least partially attributed to the success of EFT as early humans used this ability to envision, create, and experiment with beneficial cultural modifications (Vale et al., 2012). Social psychologists have also begun to look into individual differences in temporal orientation and how EFT can be used in future-oriented individuals to make decisions that later affect behavioral outcomes

(Atance & O'Neill, 2001). Some researchers believe mental time travel, which includes both EM and EFT in all temporal orientations of mental abstraction, help us consolidate personal experiences into an identity that persists over time (Suddendorf & Corballis, 2007). This purpose of identity is of utmost interest to the current study in ascertaining its role in EFT.

There are several factors which could interact with EFT by way of helping to form one's identity over time. These are aspects of time perception including estimation of the passage of time and temporal orientation. Time perception is a fundamental aspect of conscious existence, so the representation of the self-relative to other points is highly relevant to the study of identity and EFT. Life events are inherently linked to time because each life event takes place at a particular time which is used to gauge the distance in time an individual is from the present to the event (Fingerman & Perlmutter, 1995). In some cultures, time is represented linearly from past to future, cyclically, or even according to cardinal directions, which leads to differences in cognition (Boroditsky & Gaby, 2010). Temporal focus could influence attitudes, decision making, and behavior especially in regard to personality, motivation, learning, self-regulation, logic, and strategy (Shipp et al., 2009). Some argue people in the United States tend to view the future as a positive light and view remembering the past in a negative light particularly as stagnation and an inability to live in the present, but this perspective changes with age as

people get more pessimistic about the future and nostalgic about the past (Fingerman & Perlmutter, 1995). Additionally, one keeps track of time internally independent of external time cues which is called subjective time. Because it is relative, subjective time is what people use to perceive the present in relation to recollections of the past and anticipation of the future (Shipp et al., 2009).

Personal Background influences Cognition

There is a social dimension to memory which comes about from one's history and lineage, and within a cohort of one's contemporaries, all of which could be colored by factors such as generational trauma, continuation of oral history, affinity or diversion from aspects of one's culture over time (Olick & Robbins, 1998). Recent work from multicultural neuropsychologists has suggested that language and culture play a role in episodic memory (Rivera Mindt et al., 2008; Alea et al., 2019). For example, language at encoding and language at retrieval affect which memories are available upon retrieval (Marian & Neisser, 2000; Scrauf & Rubin, 1998). and the quality of those memories (Schroeder & Marian, 2014). Language allows us to externalize via sharing with others a reference to different points in time through grammar which varies culturally and linguistically (Bar, 2011). Additionally, many cultures emphasize memory to preserve identity through time via storytelling, which is especially true in collectivist cultures compared to

individualist cultures (Olick & Robbins, 1998). The individualistic self-construal style philosophizes that people are independent of each other and maintain static personality characteristics, while the collectivistic self-construal style holds that people are highly interconnected and think of themselves and others in the context of social relationships (Chiao et al., 2009). Interestingly, Chiao and colleagues (2009) were able to link activity in the medial prefrontal cortex to individualistic or collectivistic orientation, which is the same region identified by D'Argembeau and Salmon (2012) as one of the most important regions for EFT. This could point to a structural relationship between the culture and EFT via the shared process of thinking about the self.

Alea and colleagues (2019) reconceptualized the stratification of individualist and collectivist labels which do not operationalize well when studying memory and temporal orientation of cultures that exist between this binary. Individualistic and collectivist self-construal styles comes from the differentiation of Asian Eastern philosophy and European Western philosophy (Chiao et al., 2009). The bounds of collectivism and individualism may be difficult to apply to Hispanic/Latino cultures which generally strongly emphasize family focus and cultural traditions, but also self-determination (Elder et al., 2009). However, it is important to note that migration to and socioeconomic influences of the United States (U.S.) has become a major part of the Hispanic/Latino narrative. Acculturation has had varying

definitions depending discipline and orientation, but it could be defined for the present context as a "measure the effects of cultural beliefs and values on health and to study how those effects may change as individuals integrate some of the values of the mainstream culture" (Siatkowski, 2007). When the influence of the U.S. dominant culture is added to the situation, acculturation then complicates levels of individualism and collectivism in a variety of domains of beliefs, values, identities, and behaviors (Zea et al., 2003). This intricate mix of factors make Hispanics/Latinos living in the United States interesting research populations, especially in regard to understanding unique neuropsychological trends that could be due to the influences of culture and language on cognition.

Processes related to episodic future thought have been studied in educated English-speaking populations, but EFT itself remains a relatively new area of study. Additionally, there is little research about people of different cultures, and how they use these complex cognitive processes in relation to their identity and world perspective. For example, an early paper about EFT and time perspective asserted, "Although self-report methods involve high mental demands, using a well-educated population can help alleviate some problems introduced by these demands. Educated adults are the best source for reporting their own subjective future time perspective" (Fingerman & Perlmutter, 1995). Quality of education and access to education are not equal, especially for minoritized populations such as

Hispanics/Latinos, which then effects performance on neuropsychological assessments (Early et al., 2013; Manly et al., 2002).

In addition to education, there are demographic factors which influence cognition, and could complete the picture to identify variability in performance on mental time travel variables between participants. Perhaps the most studied demographic covariates besides education include age and gender identification. Better cognitive performance is associated with younger age in adults, and female gender identification (Early et al., 2013). Occupation also influences cognitive performance, especially in the realm of time estimation, due to different responsibilities, tasks, and diversity of experiences in different professions (Larson, 2004). In light of recent changes with the COVID-19 pandemic, researchers have noted changes in cognitive performance as a result of infection, especially relating to episodic memory deficits (Zhao et al., 2022). Additionally, psychiatric concerns could lead to differences in mental time travel, though they will not be explored in this study. Depression could lead to negative appraisal of the future, which could influence the themes and degree of specificity of EFT (Tuchina et al., 2021). Anxiety could also affect responses due to apprehension about the future or feeling of judgement during assessment.

Significance, Research Questions, and Aims

There is currently insufficient evidence to determine how Hispanic/Latino culture and Spanish language influence EM, EFT, temporal orientation, and time estimation. This study could be part of a growing movement towards more inclusive research (Medina et al., 2021), which could help improve diagnostic accuracy and effectively normalize neuropsychological assessments about EFT. Findings in this area could elucidate some reasons why there could be differences in objective cognitive neuropsychological performance related to EFT and EM between Hispanics/Latinos and other ethnic groups (Early et al., 2013). This could then result in differences in diagnosis of neuropsychological conditions, thus resulting in health disparities. These findings could develop a clearer understanding of the unique cognition of Hispanic/Latino populations and inform more population-specific memory assessments.

Therefore, our research question is, what is the impact of culture and language on EFT? How could differences in perceptions of time and memory and future thinking manifest in the real world or on standard measures of episodic memory? I plan to explore these questions by administering a battery of neuropsychological measures including a multidimensional scale of acculturation (Zea et al., 2003), temporal focus (Shipp et al., 2009), Thinking About Life Experiences (Bluck & Alea, 2007), time estimation (adapted from the MIST; Raskin, 2009), and EM and EFT adapted from

Wang et al. (2011). I will then conduct a multiple linear regression analysis to determine how much demographic factors, culture, and language influence performance on the neuropsychological measures.

Overall, this is an exploratory study that aims to identify unique ways in which Spanish-English Hispanic/Latino populations remember and project to the future, perceive themselves over time, and perceive the passage of time. We specifically aim to ascertain the temporal focus of this population, to discover how identity evolves or stays consistent over time in Spanish-English bilingual individuals, and to measure Spanish-English bilinguals' perception of the passage of time in different ranges, beginning with seconds and minutes, to days, months, and years, and finally over the entire lifetime. Additionally, we specifically aim to determine the impact of language on recall of autobiographical memories and construction of future thoughts, and to characterize the complexity of U.S. acculturation within Hispanic/Latino culture and Spanish and English language in the context of neuropsychological processes and assessment.

Hypotheses

Our first hypothesis is about performance on the Temporal Focus Scale (TFS). We first hypothesize that for the high culture of origin identification, and high Spanish dominance will predict higher scores on the temporal focus scale for past temporal orientation. This could be due to strong values of

tradition and pride in one's heritage (Elder et al., 2009). Also, we

hypothesize that high U.S. acculturation and high English language

dominance will predict future temporal orientation. This could be because in

the U.S., individuals are taught to strategize for future successes (Guo et al.,

2012). Shipp and colleagues (2009) found individuals with future focus were

found to be more satisfied and committed to their jobs, which is an

important value in the U.S.

Our second hypothesis is also about performance on the Thinking

About Life Experiences Scale (TALE). We hypothesize that high culture of

origin identification, and high Spanish dominance will predict higher scores

on the social bonding and self-continuity functions of the thinking about life

experiences scale. Alea and Ali (2019) found this link between social and

self-continuity functions to be stronger in a Trinidadian sample, a pluralistic

society like H/Ls, than a U.S. sample. Also, we think that high U.S.

acculturation and high English language dominance will predict higher scores

on the directing behavior and self-continuity functions. Bluck and Alea

(2011) observed this was the strongest connection in the U.S. cohort. People

from the U.S. tend to interpret their life experiences from the lens of the

"self" and use them to guide behaviors for advancement of the individual

(Nisbett & Masuda, 2003).

Our third hypothesis is about performance on the time estimation task.

We hypothesize that participants with low U.S. acculturation could perceive

short-term time such as minutes and seconds longer than measured time since their temporal frame of reference is more focused on keeping track of time internally and casually rather than by looking at external cues. Conversely, English-dominant U.S. acculturated participants might be more in sync with external cues since they are used to organizing their lives by them.

Our fourth hypothesis is about performance on the PRIME task. We hypothesize that individuals with low acculturation will have a strong collective component of their mental time travel. This could be because Latin American countries of origin tend to focus on memories of their family from the past and imagining a better future for their descendants (Elder et al., 2009). We predict high culture of origin and Spanish language dominance will predict higher incidence of general details compared to specific details because their cultural and linguistic tendencies are more focused on the meaning of the story than conveying specific details. Wang (2009) found in a study of EFT in Asian and European people, that there was a Euro-American cultural emphasis on individuality and autonomy which leads to encoding of discrete memories to inform sense of self; conversely, collectivist Asians are more likely to retain generic memories that revolve around relationships of the self within a group.

Our fifth hypothesis was that demographic covariates would significantly predict mental time travel self-report measure and

performance. We hypothesize that age will predict past focus factor and EM descriptive details since participants already lived most of their lives with relatively fewer yeas to look forward to (Fingerman & Perlmutter, 1995). Additionally, we hypothesize that gender identification will predict EM and EFT collectivism since cisgender females have historically had strong social connections with other women (Carey, 1996). We also hypothesize that occupation would significantly predict gross score on the time estimation task because of different utilization of time at different types of jobs. Finally, we expect COVID-19 infection to predict the amount of descriptive and general details on PRIME because of the difficulty with episodic experiences after infection (Zhao et al., 2022).

Methods

Participants

Participants (n = 50) were an average of is 29.94 (SD = 13.70), with 12 cis-gendered males, 37 cis-gendered females, and 1 person with other gender identifications. Included participants met all participation requirements which were self-identifying as Hispanic/Latino/a/e, aged between 18 and 80 years old, fluent in both English and Spanish, ability to video conference over a secure internet connection, no history of psychiatric nor neurological impairments, and no significant auditory and visual impairments. Satisfaction of participation requirements was based on self-

report and was not verified by examiners, but examiners made sure

participants could comfortably complete testing based on satisfaction of the

requirements. Participants were recruited via verbal and written invitation,

physical flyers on Trinity College's campus and in the city of Hartford, virtual

flyers on social media, and the Trinity College online newsletter system.

Participants were compensated for their time participating in the study, and

funding came entirely from the Student-Initiated Research Grant program

for the purpose of compensating participants in this particular study. The

data for the PRIME task was deleted for eight participants due to college-

wide deletions due to limited cloud storage. These participants were asked to

retest over one year later, and PRIME task data was collected for four out of

the eight participants whose data was lost.

Materials

Demographic variables were obtained using a background information

questionnaire, a proxy task for education level, and a multidimensional scale

of acculturation which are displayed in **Table 1.** The background information

form consisted of questions asking about age, gender identification,

employment, Sars Cov-2 diagnosis, birthplace, characterization of language

development, use, and preference, and the subjective experience of time.

The scale used to identify types of employment was adapted from the Mini

Mental State Examination (MMSE) (Tombaugh & McIntyre, 1992).

Additionally, the Word Accentuation Task (WAT) was administered to

approximate level of education in Spanish (Krueger et al., 2006).

Participants read a list of multi-syllable Spanish words without accents

included and are asked to pronounce them to the administrator. Incorrect

pronunciations were measured, and more incorrect pronunciations is related

to less formal education in Spanish. We also queried participants about their

cultural identification using the Abbreviated Multidimensional Acculturation

Scale (AMAS) (Zea et al., 2003). Participants were probed about their

perceptions of U.S. culture and their self-identified culture of origin,

including the importance and degree of integration one feels within each

culture, speaking and understanding English and Spanish in different

contexts, and popular information known about each culture. Participants

responded to a four-point Likert scale ranging from "totally disagree" to

"totally agree", and "not at all" to "perfectly well".

Self-report questionnaires about subjective experiences of time and

memory were also administered. The Temporal Focus Scale (TFS) is a

measure of the extent of past, present, or future temporal orientation (Shipp

et al., 2009). Participants respond to statements such as "I imagine what

tomorrow will bring for me" and "my mind is on the here and now" with a

four-point Likert scale ranging from "never" to "always". Responses are then

coded into the past focus factor, the present focus factor, and the future

focus factor, with numerical values appointed to each level of the Likert

scale. The more a participant agrees with the statement, the higher the

numerical value of the focus factor. The Thinking About Life Experiences (TALE) Scale was used to investigate the functional purpose and use of autobiographical memory in daily life (Alea and Ali, 2019). After providing the frequency of thought and discussion about autobiographical memories using a five-point Likert scale from "almost never" to "frequently", participants use the same scale to state their agreement with statements about the instances in which they use autobiographical memories. An example of a statement is "I think about and talk about my life or certain parts of my life when I think about how the past can guide me in the future". Each statement is then categorized to serve the self-continuity function, social bonding function, or directing behavior function of autobiographical memory. The more a participant agrees with the statement, the higher the numerical value of the function.

A time estimation task was created for a direct measure of short-term time perception. The structure was adapted from the Memory for Intentions Screening Test (MIST), a measure of prospective memory in which tasks that occur over an array of specific durations are spaced out over a 30-minute session (Raskin, 2009). This test was chosen as a base for the present time estimation task because prospective memory is required for estimation of how much time passes. In the task created for this study, participants are asked to hide all clocks out of view and a timer was started at the designated starting point for the session. Then, participants were

asked to estimate when they believe time has passed, specifically 15 seconds, 30 seconds, 1 minute, 5 minutes, 10 minutes, and 15 minutes. For example, 30 seconds after the start of the session, the administrator prompts, "When I finish this sentence, please wait 3 minutes and indicate when you believe 3 minutes have passed". The participant then waited until they believe 3 minutes have passed and notify the administrator when they believe that time has arrived. They are also asked to estimate how much time has passed since the start of the session or from a cue for a length of 15 seconds, 30 seconds, 1 minute, 5 minutes, 10 minutes, 15 minutes, and 30 minutes. For example, five minutes into the session, the administrator prompts, "Time since session began" and the participant answers with how much they think has passed since the start of the session. The actual time since the start of the session is recorded, and a fraction of error is calculated which describes the degree of difference between estimated time and actual time, and if the estimation was sooner or later than the actual time.

A new measure of both episodic memory and episodic future thought was also created for this study, named the Pre- and Re-experiencing Mental Events (PRIME) task. This task was adapted from an episodic future thought task used in Wang et al. (2011) with the additions of 1) an episodic memory component, 2) prompts varying in temporal distance from the present, and 3) video recording of participants' responses to note nonverbal and tonal communication. In the PRIME task, participants are asked to give a detailed

three-minute personal story within the parameters of the prompt, and in the same language as the prompt. Each prompt either asks about the past or the future, and within a time span of 1 day, 1 month, 1 year, and 5 years. A prompt that is future oriented and in the time span of 1 year would be, "Imagine an important event that will happen to you within the next year excluding next month. What can you see? What can you hear or smell? What are you thinking about and feeling? Who are you with? What are you doing? Where are you?". After the response is given, participants are then asked what language they were imagining the event in. Each response is then scored based off the number of events given, distinct specific or general details, repeated details, thematic content, tonal variation, nonverbal cues, language at encoding, and if the story reflected collective or individualistic values.

Procedure

All testing was performed in one session of about 1 – 1.5 hours in length after obtaining informed consent. Each session was carried out in a virtual format over video conference with both the administrator and the participant in a quiet, private setting. Each participant was compensated $20 for their time. All measures were counter-balanced when administered to participants, and in the PRIME task, questions about the past and the language of the prompt were counterbalanced between participants. Participants are tested in their language of preference, with the exception of

the PRIME task which required use of both English and Spanish. Eighteen

participants preferred Spanish, and 32 participants preferred English.

Because this study occurred between May 2020 and May 2022 during

a global pandemic, the authors acknowledge that unusual stress occurred

during the duration of the study which could have confounded results, but

were out of anyone's control. The authors did, however, wish to evaluate if

contraction of COVID-19 had an effect on endorsement of self-report

questionnaires or performance on behavioral measures, so a voluntary

disclosure of COVID-19 infection was included in the background

information. Also included in the background information is an inclusive

gender identification self-report section. We included gender identification

with transgender and non-binary individuals in mind, especially due to their

historic underrepresentation and marginalization in science.

Statistical Analysis

Our main mode of statistical analysis was stepwise multiple linear

regression performed through IBM SPSS. We first used culture and language

variables as predictors. Performance on the mental time travel measures

including Time Estimation Task, TFS, TALE, and PRIME tasks were used as

outcome variables. Then, we added in demographic covariates with culture

and language variables predicting mental time travel variables.

Results

Demographic information for all participants is presented in **Table 1**. The average age in this cohort is 29.94 (*SD* = 13.70), with 12 cis-gendered males, 37 cis-gendered females, and 1 person with other gender identifications. Additionally, we used the Word Accentuation Test in Spanish to test formal education in Spanish, measured by the number of errors on the test which were, on average, 11.08 (*SD* = 7.94). Since this tested occurred during the COVID-19 pandemic and was conducted virtually, we surveyed participants about their infection status, which yielded results of 19 participants having been infected with COVID-19. We also asked about occupation and 40 out of 50 participants held their longest job in academia.

Descriptive information for culture and language predictors is located in **Table 2.** About half of the participants were born in the United States, and participants lived in the United States for an average of 22.56 years (*SD* = 14.58). Most participants' first language was Spanish and utilized both language in their daily lives.

Table 3. Contains self-report information about how participants view time. Participants think about time an average of 61.02% of the time (*SD* = 25.27), report to be late an average of 32.20% of the time (*SD* = 28.79) and worry about being late 52.66% of the time (*SD* = 29.67).

Descriptive information for each of the mental time travel measures is shown in **Table 4**. The grand mean for past focus factor on the TFS was 11.82 (*SD = 1.84*), present focus factor was 11.41 (*SD* = 1.77), and future focus factor was 11.69 (*SD* = 1.88). For the TALE, the grand mean of the self-continuity function was 14.54 (*SD* = 3.37), social bonding function was 16.90 (*SD* = 1.88), and guiding behavior function was 18.30 (*SD* = 3.18). The grand mean of gross score on the time estimation task was 142.18 (*SD* = 48.77). The mean of EM imagination collectivism was .56 (*SD* = .29), while EFT collectivism was .55 (*SD* = .31). EM descriptive details was an average of 22.27 (*SD* = 6.30) and EFT descriptive details was 18.44 (*SD* = 6.24). EM general details was an average of 2.36 (*SD* = 2.64) and EFT general details was 2.01 (*SD* = 1.89).

We conducted multiple linear regressions to analyze if culture, language, and related demographic covariates could explain the variance in measures of mental time travel. To do this, we first computed variables that represented the average scores across all time points for EM and EFT in collectivism versus individualism, descriptive details, and general details. Next, we created a model using an alpha criterion of .05 utilizing culture and language predictors recorded in the current study, which we then used to predict each outcome variables. We then used a stepwise multiple linear regression to identify which variables significantly predicted the outcome variable.

Hypothesis 1

We first hypothesized that cultural identification and language use would predict temporal orientation. Specifically, we hypothesized that culture of origin identification measured by AMAS variables, years living in the U.S., and birthplace, and Spanish language dominance, measured by language preference, usage, method of language acquisition, and years speaking each language, would be strong predictors of past temporal orientation on the TFS. Contrastingly, we expected U.S. cultural identification and English language dominance would significantly predict future temporal orientation on the TFS.

A multiple linear regression using the stepwise method accounting for culture and language predictors was conducted to identify if they had a significant effect on the variance in the past focus factor. AMAS Culture of Origin score (β = 2.43, p = .003) and preferred language (β = -1.16, p = .014) together formed a statistically significant model predicting past focus factor (R^2 = .273, $F(1, 33)$ = 4.44, p = .006).

A stepwise method multiple linear regression was used to test if the complete set of predictor variables significantly predicted present focus factor. No variables reached significance in predicting past focus factor.

For the future focus factor, we used a stepwise multiple linear regression to test the predictive value included culture and language

variables on future focus factor. It was found that AMAS Culture of Origin score (β = 1.72, p = .016) predicts future focus factor (R^2 = .163, $F(1, 33)$ = 6.44, p = .016).

In addition to the TFS, we also surveyed participants through questions probing how they think about time in their daily lives. Participants responded with variable answers about their thoughts and worries about time as shown in **Figure 1., Figure 2., Figure 3.** Thirty-one participants out of 50 responded that they are usually on time for meetings according to **Figure 4.** A chi-square test of independence was performed to examine the difference between frequencies of reported timeliness. The relation between earliness, on-time, and lateness was significant, $X2$ (2, N = 50) = 17.86, p < .001**.** Participants were more likely to report being on time than late or early**.** Finally, in accordance with **Figure 5.,** participants used a watch for external time cues most frequently. A chi-square test of independence was performed and it was found that this difference was significant, $X2$ (2, N = 50) = 14.06, p < .001**.**

Hypothesis 2

Our second hypothesis was that culture and language affects how people use their episodic experiences in their daily lives. We specifically anticipated that the social bonding and self-continuity functions of the TALE would be most significantly predicted by culture of origin identification and

Spanish language dominance. Comparatively, we expected U.S. cultural

identification and English language dominance to predict the guiding

behavior and self-continuity functions of the TALE most strongly.

Multiple linear regression was used to evaluate TALE functions.. A

stepwise multiple linear regression revealed a significant relationship

between language spoken in the home (β = 1.72, p = .027) and the self-

continuity function (R^2 = .135, $F(1, 34)$ = 5.31, p = .027). There were no

significant relationships between the predictors and any of the other two

TALE outcome variables, guiding behavior function and social bonding

function.

Hypothesis 3

Our third hypothesis was that culture and language influence the way

people gauge the passage of time over short-term time intervals.

Specifically, we hypothesized that identification with culture of origin and

Spanish language dominance would predict performance on the time

estimation task, measured by gross score of time estimations compared to

actual time passed.

Thus, we conducted a multiple linear regression to investigate if the

culture and language predictors influenced performance on the time

estimation task. It was found that AMAS U.S. Culture score (β = 48.77, p

= .043) predicts gross score (R^2 = .119, $F(1, 33)$ = 4.44, p = .043).

Hypothesis 4

Our fourth hypothesis is that culture and language will affect the ways in which the participants reported their mental time travel to both the past and the future. Specifically, we postulated that culture of origin identification and Spanish language dominance would significantly predict a collectivist perspective of both past and future imaginations. Additionally, we hypothesized that the same predictors, culture of origin identification and Spanish language dominance, would predict general details and would not predict specific descriptive details in these mental abstractions.

A multiple linear regression was conducted to test the model including the standard set of covariates which we used to predict collectivism on the EM component of PRIME. Years living in the U.S. (β = .007, p = .006) and first language predict (β = .242, p = .017) episodic memory collectivist component (R^2 = .310, F(1, 32) = 7.18, p = .003). The same two variables predicted the collectivist component of EFT on PRIME as well: Years living in the U.S. (β =.008, p = .007) and first language (β = .378, p = .003) predict EFT collectivist component (R^2 = .357, F(1, 32) = 8.871, p < .001).

The next PRIME variable to be evaluated was the amount of both descriptive and general details given by participants in their stories. A stepwise linear regression revealed that years living in the U.S. (β = 48.77,

p = .043) predicts EM descriptive details (R^2 = .117, $F(1, 33)$ = 4.36, p

= .045). However, no culture and language predictor variables predicted EFT

descriptive details. In regard to general details, a stepwise multiple linear

regression with culture and language variables predicting EM general details

was insignificant. Conversely, AMAS U.S. culture score (β = 48.77, p = .043)

predicts EFT general details (R^2 = .235, $F(1, 33)$ = 10.12, p = .003).

Hypothesis 5

Our final hypothesis was that demographic covariates would predict

some outcome variables. Specifically, that age would predict past focus

factor and EM descriptive details, gender identification would predict EM and

EFT collectivism, occupation would predict time estimation gross score, and

COVID-19 infection would predict descriptive and general details on both EM

and EFT of PRIME.

None of the demographic covariate predictors made significant models

with TALE nor time estimation outcome variables, but there were significant

relationships demographic covariates, some culture and language predictors,

and mental time travel outcome variables.

Using a stepwise multiple linear regression, it was found that none of

the demographic covariates significantly predicted past focus factor.

However, it was found that COVID-19 infection status (β = 1.42 p = .018)

significantly predicted present focus factor (R^2 = .16, $F(1, 33)$ = 6.20, p

= .018). It was also found that AMAS culture of origin (β = 1.98, p = .004)

and COVID-19 infection status (β = 1.47, p = .016) significantly predicted

future focus factor (R2 = .305, F(1, 32) = 7.02, p = .003).

Additionally, amongst the demographic predictors, years in the U.S. (β

= .304, p = .005) and age (β = -.260, p = .040) significantly predicted EM

descriptive details (R2 = .227, F(1, 32) = 4.71, p = .016). Also, AMAS

culture of origin (β = -2.30, p = .002) and COVID-19 infection status (β =

1.20, p = .029) significantly predicted EFT general details (R2 = .342, F(1,

32) = 8.30, p = .001). Finally, demographic predictors did not form

significant models with neither EM nor EFT collectivistic perspective, EFT

descriptive details, nor EM general details.

Discussion

The purpose of this study was to explore the influence of culture and

language on mental time travel. Specifically, we used stepwise multiple

linear regression to analyze the predictive value of culture and language

variables, along with demographic covariates, on behavioral and self-report

measures of episodic future thought. Culture predictor variables included

AMAS variables, years living in the U.S., and birthplace, and language

dominance was measured by language preference, usage, method of

language acquisition, and years speaking each language.

Hypothesis 1

For our first hypothesis, we predicted that culture and language inputs would form a significant model when predicting temporal focus. Specifically, we hypothesized that culture of origin identification and Spanish language dominance would predict past focus factor, and that U.S. cultural identification and English language dominance would predict future focus factor. Firstly, we found that culture of origin identification and preferred language predict past focus factor. This finding was in-line with our hypothesis. Secondly, we found that there were no significant predictors for present focus factor. We did not hypothesize a relationship between culture and language variables and present focus factor. Finally, we found that culture of origin identification predicted future focus factor. This finding was in contrast with our hypothesis.

These findings could be understood through the notion that Hispanics/Latinos have an emphasis on traditions which continue from the past and a hope for socioeconomic progress in the future. A study comparing collectivist Middle Eastern people and individualistic Scandanavian people found that the collective culture was more oriented to the future than the individualist, which is consistent with our results (Ottsen & Berntsen, 2015). In their article about collective memory and collective future thought, Szpunar and Szpunar (2016) describe collective memory, which an individual

member of a group remembers the group's past, heritage, and legacy, as related to collective future thought by determining what the collective remembers to achieve its future goals. One could conceptualize hope for the future from a neuropsychological lens through EFT. For example, a study conducted by Fingerman and Perlmutter, showed that EFT could be used to exert control over one's future by using present conditions to imagine the future which they are aiming for (1995). Other studies found that future projections were more positive than past projections (D'Argembeau & Van der Linden, 2006; Guo et al., 2012; Ottsen & Berntsen, 2015; Shao et al., 2010). We observed this while administering the PRIME task where thematically, participants envisioned their desired future; none of them condemned themselves to a life they would not want. Generational time-based knowledge into the future could be for the preservation of one's legacy and culture (Harris et al., 2014). This also makes sense with the predominantly immigrant narrative of moving to the U.S. for a better life, and expectations for social and economic progress with each generation.

We also found that most participants perceived themselves to be on time and that they used a watch rather than a wall clock or a calendar. Use of external time cues makes sense because artifacts like calendars and clocks helped people accurately predict cyclical events which helps increase probability of success in survival since humans tend to have an unreliable internal clock (De Smedt & De Cruz, 2011). In regard to timelines,

colloquially, there is a stereotype that Hispanics/Latinos are often late for appointments or meetings. This is directly in contrast with the belief in timeliness that is important in U.S. society. Perhaps acculturation to the U.S. standards of time adherence have highly influenced this cohort since they all had occupations within the U.S. which require them to think in this way. Most participants worked in academia the longest, which means that class schedules and deadlines are part of their daily lives, and could influence timeliness expectations. It should also be noted that this value is self-reported timeliness, rather than actual timeliness. A future study might benefit from quantifying timeliness of participants to their session, which could differ from their self-reported timeliness, as we have noticed in this study.

A participant in a previous study described the belief commonly held by Hispanics/Latinos identifying with their culture of origin best, "I would rather be late for class than end a great conversation". This value placed on enjoying the moment they are living in rather than a value on timeliness could be relevant in neuropsychological treatment especially related to prospective memory and attentional tasks. While empirically investigating a stereotype could seem to be a trivial matter for an academic paper, it is important to explore popular cultural notions and patterns in neuropsychology to better elucidate the population of interest to understand their perspective. This could allow the practitioner a clearer view into how

they think and behave to evaluate them accurately and design feasible

treatment plans if necessary.

Hypothesis 2

For our second hypothesis, we postulated that the three functions of

TALE would be significantly influenced by culture and language variables.

Specifically, we postulated that culture of origin identification and Spanish

language dominance would predict social bonding factor and self-continuity

factor. We also hypothesized that U.S. cultural identification and English

language dominance would predict directing behavior and self-continuity

functions. We found that no culture nor language variables predicted TALE

scale self-report values. This evidence does not support our hypothesis.

The Thinking About Life Experiences scale focuses on why humans

remember long-term information about their own experiences rather than

how they remember it (Bluck & Alea, 2011). According to Olick and Robbins

(1998), we reconstruct memories in the context of our relationships with our

surroundings; memories live on based on their importance to collective

memory. This relates to the "why" focus of the TALE in regard to episodic

information. Perhaps our null findings could represent that Hispanics/Latinos

regardless of cultural alignments or linguistic preferences use episodic

information for all functions described in the TALE scales. Previous studies

have found relationships between culture and language variables, and TALE

subscales. The directing behavior function has been associated with culture, where Middle Eastern people used the function more than Scandanavian people, which may be due to the collectivist value of adhering to social norms (Ottsen & Berntsen, 2015). Preserving an episodic memory is highly selective but when a memory is chosen to be preserved, it is detailed and organized in such a way that it could be told in a story in casual conversation, which highlights the importance of the social dimension of episodic information that could theoretically vary with culture (Desalles, 2007). This relates to the social bonding function of the TALE. While the results of this study did not find a significant relationship between the function of autobiographical information and culture and language variables, this is a valuable line of research for future studies.

Hypothesis 3

Our third hypothesis was that time estimation trends could be predicted by cultural identification and language use. Specifically, we hypothesized that culture of origin identification and Spanish language dominance would lead to an overestimation of time, while U.S. cultural identification and English language dominance could lead to synchronicity with the clock. We found that AMAS U.S. culture score predicted gross score, which means that people who identify with the U.S. overestimated the

amount of time that passed. Thus, the findings were contrary to the hypotheses.

Our finding of overestimation of time passing could be due to the fast pace of life in the U.S. which causes the internal clock to move at fast speeds to keep up with timely demands. A study by Thomas and Weaver showed that people underestimated time when busy, but overestimated time when bored: participants estimated the duration of time which has passed as shorter when a stimulus was presented, but longer when no stimulus was presented (1975). Perhaps their focus on filling out self-report assessments during the time estimation task was not enough to fill up their attentional demands. This could especially be true in the modern U.S. context of quick entertainment via social media than encourages multitasking and a shorter attention span (Bardhi et al., 2010). The brain has its own perception of self-continuity over time through circadian rhythms in addition to top-down processes in frontal cortex which create an estimation that synchronizes sensory input into internal time (Hancock, 2005), which could vary across cultures. For example, there could be dated events or relative events within a subjective sense of time which could lead one to interpret time as the flow of experience – or time could not be important at all (Friedman, 2007).

Hypothesis 4

The fourth hypothesis stated that culture and language variables would significantly predict PRIME variables including collectivistic perspective, descriptive details, and general details of EM and EFT events. Specifically, we hypothesized that culture of origin identification and Spanish language dominance could predict collectivism and general details. Alternatively, we postulated that U.S. cultural identification and English language dominance would influence specific details and individualism. We found that years living in the U.S. and first language predicted both EM and EFT collectivism. These findings do not agree with our hypothesis. Also, years living in the US predicted EM descriptive details, and U.S. culture predicted EFT general details. These findings are partially supportive of our hypothesis.

The results that culture and language influence EM and EFT are supported within the literature. Both collectivism and temporal focus have been implicated in the process of attention and perception especially in regard to life events (Nisbett & Masuda 2003; Shipp et al., 2009). Collectivist perspective could be influenced by years living in the U.S. and first language specifically since Spanish speakers living in the US could feel solidarity with people they feel connected with who are other Spanish speakers in Hispanic/Latino communities. Collectivists view change as part of their lives rather than things staying the same and focus on networks of

connections rather than relationships with a single object (Nisbett and

Masuda, 2003; Wang, 2009). This supports the community orientation of

collectivistic people, which is very common in Hispanic/Latino communities.

It is particularly fascinating that the same two predictor variables were

significant for both EM and EFT, which highlights the interrelatedness of the

two functions. It has been theorized that mental time travel has allowed

people to conceptualize time itself through understanding a continuity from

past to present to future along the same continuum (Suddendorf & Corballis,

2007).

The second set of findings from the PRIME task about quantity of

details given during reconstruction or pre-experience of an event could be

understood by also examining collectivist and individualist orientation. It

could be possible that individualistic values from the U.S. lead people to give

more details in their PRIME responses. This notion of increased detail of

events from individualist compared to collectivist people has been supported

by previous studies (Tuchina et al., 2021; Wang, 2009). Wang (2009)

explains this difference through the context of European cultural emphasis

on individuality and autonomy which leads to encoding of discrete details to

inform a sense of self, while collectivist Asian people are more likely to retain

generic memories that revolve around relationships of the self within a

group. Since the scoring for PRIME quantified the number of general and

descriptive details, this relationship to U.S. culture could be due to these differing expectations of EM and EFT in different cultural contexts.

Hypothesis 5

Finally, we postulated that demographic factors alongside culture and language variables would significantly predict performance on mental time travel variables. Specifically, we hypothesized that age would predict past focus factor and general details on PRIME, gender identification would predict collectivism, occupation would predict time estimation performance, and that COVID-19 infection would influence how detailed PRIME imaginations were. The significant relationships found included COVID-19 predicting present focus factor, AMAS culture of origin score and COVID-19 infection predicting future focus factor, which did not support our hypotheses. Additionally, years in the U.S. and age predicted EM descriptive details, and AMAS culture of origin and COVID-19 infection status predicted EFT general details, which supported our hypothesis.

The finding that COVID-19 infection predicts both present and future focus factors could have implications in behaviors as a result of both lockdown and personality. A previous study examining temporal orientation in relation to the COVID-19 pandemic using Twitter found that past focus was linked to COVID-19 spread, present focus was linked to a reduction in spread of COVID-19, and there was no relationship to future focus and

COVID-19 cases (Barnes, 2021). These results are in contrast to the present

findings which link COVID-19 infection with present and future focus. It

could be possible that the present findings manifested from present focus

leading to risky behavior in the present which causes infection, and future

focus of hope for a post-pandemic society now that the reality of infection is

upon the masses.

In alignment with our hypothesis, an effect of age on the details of EM

would make sense due to their abundance of EM compared to EFT. EM could

be more emphasized for older adults because they have lived longer, and

when they think about the majority of their life, it is in their past, even

though they could still be hopeful about their future (Fingerman &

Perlmutter, 1995). Also, COVID-19 infection is associated with fatigue in

sustained attention and EM over time (Zhao et al., 2022). Since the PRIME

task is thirty minutes long, it would make sense that fatigue could influence

performance where more general, or less relevant, details were given

compared to descriptive details.

Strengths, Limitations, Implications, and Future Directions

A strength of this study was using behavioral measures in addition to

self-report measures for mental time travel tasks. Especially when

assessing EM and EFT, and time estimation, the subjectivity of the

experience could make self-report measures unreliable between participants

due to differences in appraisal. In the case of the PRIME, participants

sharing stories rather than marking a Likert scale allows for more inquiry

into the functional use of EM and EFT and what the participant values which

increases ecological validity.

        A further strength of the current study would be the format of the

PRIME task. This allowed participants to express themselves in an

autonomous way by allowing a free response in theme and composition of

PRIME imaginations. This allows examiners to get neuropsychological

information about the participant as an individual without comparing them to

a set criteria, which could happen if the assessment is normed. It would be

interesting to employ PRIME as an intervention help people to think about

their lives critically since the task prompts individuals to think about wide

spans of one's life. However, this format is also a limitation since

quantitatively scoring PRIME is a subjective task which could vary between

raters. This study employed only one researcher to score all PRIME

information, but there could be differences in administration style people

based on social comfortability, mood, and timeliness of the session. Future

studies could ease this limitation by having one administrator who also

scores PRIME. Perhaps a future study could also administer PRIME online

where participants type in their responses and have a word minimum they

have to meet instead of a time minimum for speaking. This could allow

implementation of computer programming for analysis of responses in

regard to number of details and syntax. However, this method would

exclude important nonverbal communication factors such as tone of voice

and body language which could be captured using a verbal version of PRIME.

A further concern about the design of PRIME is that it was difficult in some

instances for participants to keep their event within one day. They would

often digress into a play-by-play of their day or of a vacation instead of

imagining themselves in a moment in the seconds to minutes timeframe.

This was especially true the closer to the present the reported event was.

Perhaps this demonstrates that Hispanics/Latinos communicate events

outside of the present on a larger timeframe than traditionally thought by

EFT researchers. A "moment" has a particularly ambiguous definition, and

the participants defined it in their own ways.

      A limitation of the current study which could be improved upon by

future studies includes a more flexible approach to the status of

Hispanics/Latinos in the U.S. as a heterogeneous group. For instance, since

this study was based in the United States, many people have experienced

both languages through their daily lives so the forced choice between English

or Spanish as a preferred language could have been inaccurate. Additionally,

many participants responded to PRIME in a mixture of Spanish or English

whether it was technical words which they learned and use in English or

familial phrases they learned and use in Spanish, there was consistent use of

both languages simultaneously which could be addressed in a further study.

Additionally, we only measured education in Spanish and not in English.

Future studies should have measures of education for both English and

Spanish. Also, we only allowed report of one family culture of origin,

whereas people could have multiple, such as one participant who is half

Colombian, half Mexican.

One way a future researcher could improve the current study would be

to increase control for confounds such as effort and self-report style. Some

people endorsed higher values for their overall test than others. It could be

possible that this reflects conservative or liberal a self-report style.

Additionally, some participants could have been distracted or attempting to

alter their performance to achieve results they wanted or they believed the

examiners wanted. Future studies should evaluate this, especially when

relying upon several self-report measures as the current study did.

A further limitation of this study could be the influence of personal

relationships to the examiners. Since this is a community-based study in

which participants were recruited by students, family members and friends

were included in this study. This could compromise the content of the PRIME

due to familiarity with the individual's experiences in the past and thoughts

about the future. During the time estimation task, there could be an increase

in prospective memory errors due to their interest in conversation rather

than silently filling out self-report questionnaires. Still, this level of

familiarity between the examiner and researcher could have helped

participants be more honest and give more details during PRIME and

demonstrate more effort during testing to aid the progression of the study.

A critical component of administering a research study with diverse

populations of human participants would be to ensure that test

administration is specific and accessible to the population of interest. This

was indeed one motivation of pursuing this study to demonstrate that one's

background influences cognition, and a strength of this study was in allowing

participants to be tested in their preferred language and administering

virtually to ease transportation and time commitment barriers. However,

specificity of the wording for all the assessments used could be improved by

tailoring the wording to specific countries of origin. Just as there are

differences in dialect between Chicago natives and New York natives, there

are dialectic differences between Spanish speaking regions across the

Western hemisphere. This begs the question if Hispanics/Latinos living in the

U.S. should even be grouped together to insinuate homogeneity based off of

a common language and region of origin when cultural differences vary so

greatly amongst people from different Latin American countries. This should

be carefully evaluated by researchers seeking to conduct research with

Hispanics/Latinos.

It would be interesting to apply this study to a more specific population, either within a particular region of the U.S., particular country of origin while living in the U.S., or even in a cohort of people still living in Latin America. Hispanics/Latinos throughout the U.S. come from different cultures in different regions of Latin America, varying city or country environments, varying educational quality, or citizenship or generational status. This is part of the complexity of studying Hispanics/Latinos in the U.S.: they are not a homogeneous group.

Conclusions

The most central piece to this study is identity. One participant said to me after testing was finished with the session that the storytelling aspect allowed him to express how he uses mental time travel: "In my culture, I hold thinking about important things that have happened to me close to my heart, and also think about what important things I hope will happen. I use it to remember my identity." It seems that the participants used their abstractions outside of the present to imagine experiences that make them who they are into a continuous self over time. We decide who we are from our beliefs and experiences which are stored and created through episodic memory and episodic future thought over spans of time. In this particular case with Hispanics/Latinos living in the United States, cultural and linguistic identity are a central aspect of one's life and influence cognition. While

certainly not a heterogeneous group, Hispanics/Latinos evidently have differences in mental time travel performance based on culture and language. This is relevant especially in a clinical context where performance on a task involving mental time travel is normed against other people. There could be difference in performance that are not due to individual differences, but rather to differences in background between the normed population and the individual being tested. Neuropsychologists working every should be aware of the cultural sensitivity of neuropsychological assessments, but also of cultural differences in norms which could manifest in differences in behavior and communication style. Catering to multicultural populations means more than translation of assessments into different languages, but careful attention to differences in cultural perspective which influence one's cognition.

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Appendix

Table 1. Mean and standard deviation, or n, of demographic information.

Demographic Variable	Mean (s.d.) or n	Range
Age (years)	29.94 (*13.70*)	18-62
Gender (F/M/NB)	37/12/1	--
Spanish Education (WAT Errors)	11.08 (*7.94*)	0-35
Longest Occupation (Academic, Government, Healthcare, Hands-on, Self-employed, other)	40/1/2/1/4/1/1	--
COVID-19 Infection (Yes/No)	19/31	--

Table 2. Mean and standard deviation of culture and language variables.

Measure	Mean (*S.D.*) or n	Range
Born in U.S. (Yes, No)	24/26	--
Years in the U.S.	22.56 (*14.58*)	0-62
First language (English/Spanish)	9/41	--
Years speaking English	20.54 (*13.39*)	2-58
Years speaking Spanish	29.6 (*13.84*)	18-62
How learned English (Home, School, Friends, Multiple)	3/25/2/20	--
How learned Spanish (Home, School, Friends, Multiple)	33/1/1/15	--
Language of Thought (English/Spanish/Both)	16/7/27	--
Preferred Language (English/Spanish/Both)	24/18/8	--
Language Spoken in the Home (English/Spanish/Both)	8/23/19	--
Language with Friends (English/Spanish/Both)	19/8/23	--
Language at Work (English/Spanish/Both)	35/2/13	--
Majority of Time Language (English/Spanish/Both)	30/7/13	--
AMAS U.S. Culture Score	3.04 (*0.44*)	2.05-4
AMAS Country of Origin Score	3.22 (*0.46*)	2.04-4

Table 3. Mean and standard deviation of self-report time perspective

questions.

Measure	Mean (*S.D.*) or n	Range
Frequency of Thought about Time	61.02 *(25.27)*	10-100
Frequency of Lateness to a Meeting	32.20 *(28.79)*	0-100
Frequency of Worry about Lateness	52.66 *(29.67)*	3-100
Frequency of Self-Reported Timeliness (Early/On-Time/Late)	10/32/8	--
Frequency of Self-Reported Use of External Time Trackers (Watch/Wall Clock/Calendar)	25/5/20	--

Table 4. Mean and standard deviation of mental time travel measures.

Measure	n	Mean	Standard Deviation
Time Estimation Gross Scores	48	142.18	48.77
TALE Self Continuity Function	50	14.54	3.37
TALE Social Bonding Function	50	16.9	3.92
TALE Guiding Behavior Function	50	18.3	3.18
Temporal Focus Scale Past Focus Factor	49	11.82	1.84
Temporal Focus Scale Present Focus Factor	49	11.41	1.77
Temporal Focus Scale Future Focus Factor	49	11.69	1.88
PRIME Episodic Memory Collectivist Component	46	.56	.29
PRIME Episodic Future Thought Collectivist Component	46	.55	.31
PRIME Episodic Memory Descriptive Details	46	22.27	6.30
PRIME Episodic Future Thought Descriptive Details	46	18.44	6.24
PRIME Episodic Memory General Details	46	2.36	2.64
PRIME Episodic Future Thought General Details	46	2.01	1.89

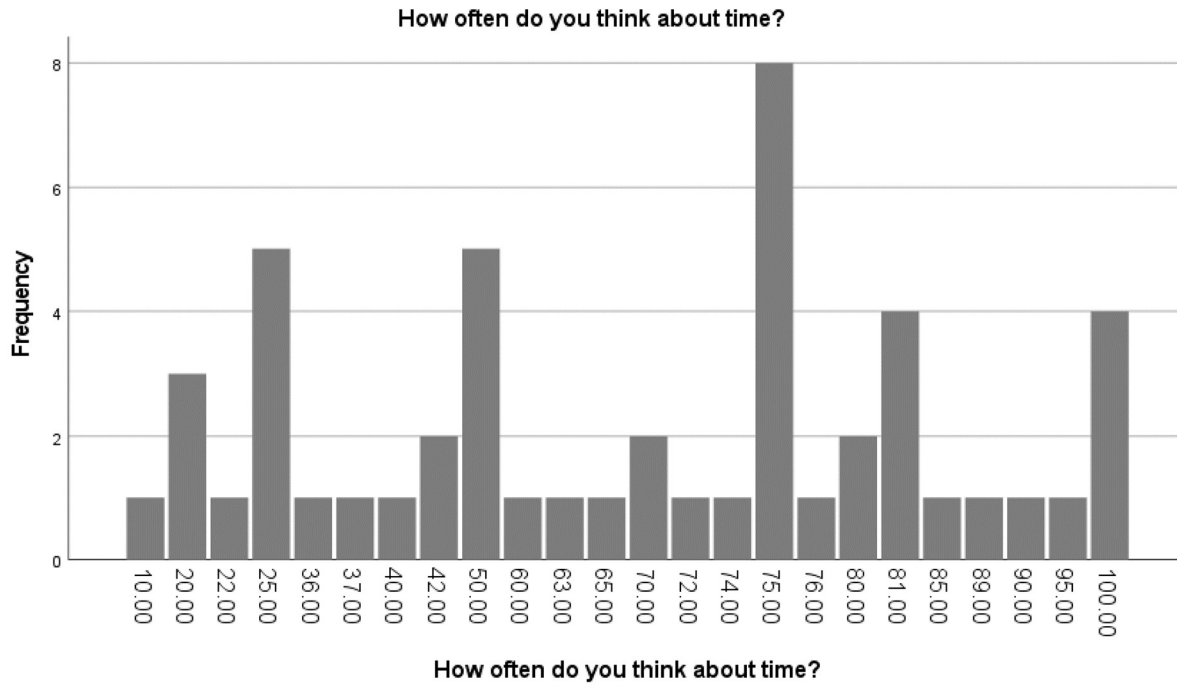**Figure 1.** Frequency of thought about time (% of time).

Figure 2. Frequency of lateness to a meeting (% of time).

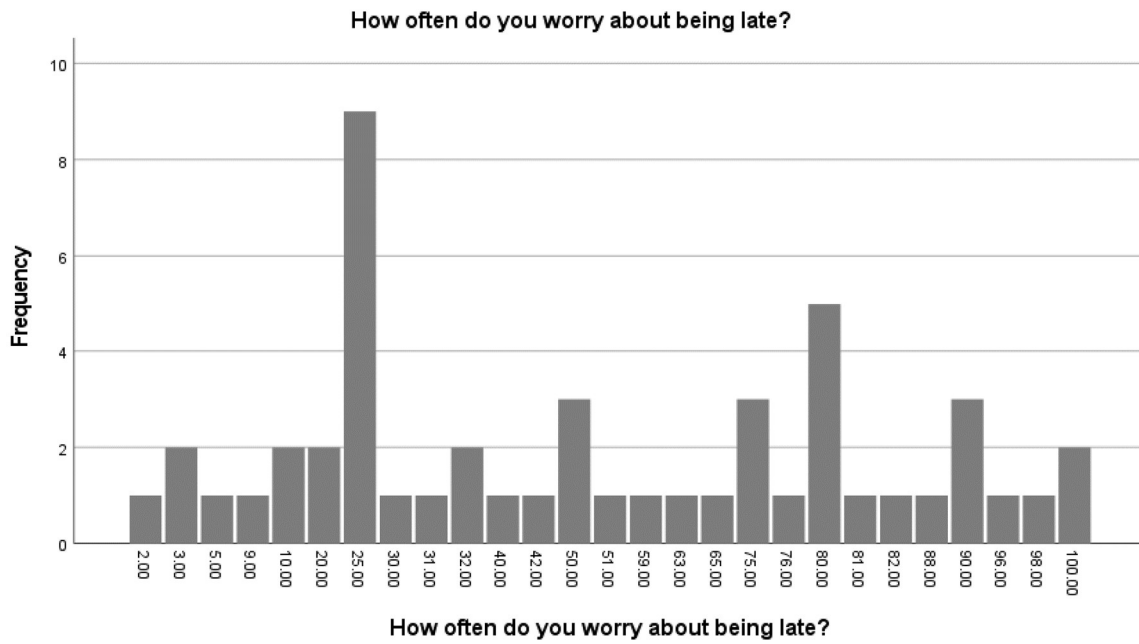**Figure 3.** Frequency of worry about lateness (% of time).

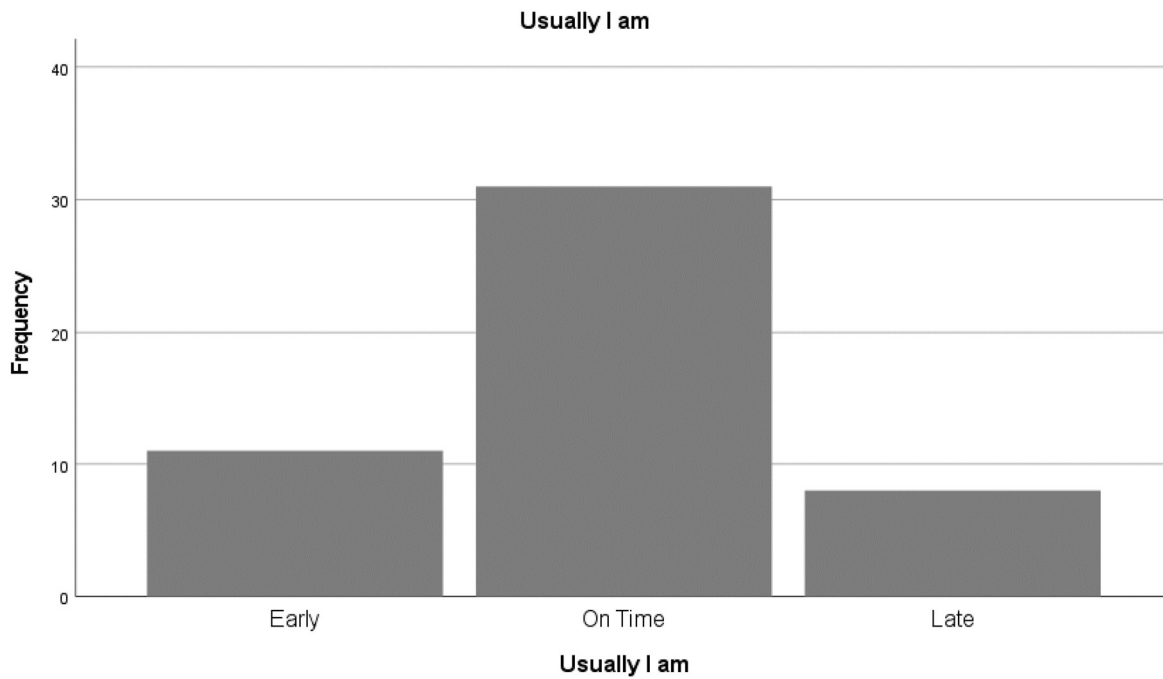**Figure 4.** Frequency of self-reported timeliness.

Figure 5. Frequency of self-reported use of external time trackers.