

# The Nexus Between Cognitive Flexibility and Prejudicial Attitudes in Younger and Older Adults

2019

Yerika Germosen  
*University of Central Florida*

Find similar works at: <https://stars.library.ucf.edu/honorstheses>

University of Central Florida Libraries <http://library.ucf.edu>

 Part of the [Psychology Commons](#)

## Recommended Citation

Germosen, Yerika, "The Nexus Between Cognitive Flexibility and Prejudicial Attitudes in Younger and Older Adults" (2019). *Honors Undergraduate Theses*. 497.  
<https://stars.library.ucf.edu/honorstheses/497>

This Open Access is brought to you for free and open access by the UCF Theses and Dissertations at STARS. It has been accepted for inclusion in Honors Undergraduate Theses by an authorized administrator of STARS. For more information, please contact [lee.dotson@ucf.edu](mailto:lee.dotson@ucf.edu).

THE NEXUS BETWEEN COGNITIVE FLEXIBILITY AND PREJUDICIAL ATTITUDES IN  
YOUNGER AND OLDER ADULTS

by

YERIKA GERMOSEN

A thesis submitted in partial fulfillment of the requirements  
for the Honors in the Major Program in Psychology  
in the College of Sciences  
and in the Burnett Honors College  
at the University of Central Florida  
Orlando, Florida

Spring Term, 2019

Thesis Chair: Charles Negy, Ph.D.

© Yerika Germosen

## ABSTRACT

The mutability of prejudicial attitudes can be elucidated by taking into account the declines in cognition that tend to emerge as we age. This study aimed to assess whether there is a relationship between prejudice towards different ethnic groups and cognitive flexibility throughout adulthood. Ninety-five older adults and 118 younger adults were asked to complete an electronic survey encompassing measures of cognitive flexibility, social desirability, personality, optimism, empathy, ethnic attachment and prejudice. It was hypothesized that older adults would report lower levels of cognitive flexibility and higher levels of ethnic attachment in comparison to younger adults, which would in turn make the inverse relationship between cognitive flexibility and prejudice stronger in older participants. The results did not support the hypotheses predicting that there would be cohort differences in cognitive flexibility and ethnic attachment. As expected, there was a negative correlation between prejudice and cognitive flexibility, but it was only significant in younger adults before controlling for the influence of social desirability. Additionally, regression models predicting prejudice based on cognitive flexibility and ethnic attachment were significant before and after controlling for social desirability, but only in younger adults. Exploratory analyses indicate that the strength of the correlations between all study variables were generally lower in older adults. The findings presented here raise an argument for evaluating how the interplay between prejudice and cognitive flexibility may change in the later stages of life.

**Key Words:** Cognitive flexibility, prejudice, ethnic identity and older adults.

## **DEDICATION**

To my father, for always propelling me to think and act like an academic.

## **ACKNOWLEDGMENTS**

I am deeply grateful for the guidance and support of my thesis chair, Dr. Charles Negy. Thank you for taking me under your wing.

Dr. Nichole Lighthall, thank you for serving as my committee member and stimulating my curiosity for studying the aging brain.

Finally, I would like to recognize the Learning Institute for Elders (LIFE) at the University of Central Florida for being so welcoming about promoting participation in this study.

## TABLE OF CONTENT

INTRODUCTION .....	1
THE USES OF THE COGNITIVE FLEXIBILITY CONSTRUCT .....	2
CHANGES IN COGNITIVE FLEXIBILITY THROUGHOUT ADULTHOOD.....	5
ETHNIC IDENTITY AND COGNITIVE FLEXIBILITY .....	8
ETHNIC IDENTITY AND PREJUDICE .....	9
RESEARCH QUESTIONS .....	11
METHOD .....	12
PARTICIPANTS .....	12
MEASURES .....	12
DEMOGRAPHIC INFORMATION .....	12
COGNITIVE FLEXIBILITY INVENTORY .....	12
PREJUDICE .....	13
ETHNIC ATTACHMENT .....	13
EMPATHY .....	14
PERSONALITY .....	14
OPTIMISM.....	16
SOCIAL DESIRABILITY.....	16
PROCEDURE.....	17
RESULTS .....	18
COGNITIVE FLEXIBILITY IN YOUNGER VERSUS OLDER ADULTS .....	18
ETHNIC ATTACHMENT IN YOUNGER VERSUS OLDER ADULTS .....	18
PREJUDICE AND COGNITIVE FLEXIBILITY .....	18
COGNITIVE FLEXIBILITY, ETHNIC ATTACHMENT, AND PREJUDICE .....	19
EXPLORATORY ANALYSES WITH ADDITIONAL STUDY VARIABLES .....	19
DISCUSSION .....	21
LIMITATIONS.....	25
CONCLUSION.....	26
APPENDIX A: SCORES ON MEASURES.....	27
APPENDIX B: BIVARIATE CORRELATIONS .....	30
APPENDIX C: REGRESSION ANALYSES.....	33
REFERENCES .....	36

## INTRODUCTION

Everyday interactions with others involve fast person perceptions that can be modulated with cognitive strategies. Executive functions (EFs) are a series of cognitive resources that may be elicited in social encounters given that they make it possible to dissect ideas, reflect before acting, and stay focused (Diamond, 2013). Moreover, Barkley (2012) defines executive functioning as “self-directed actions needed to choose goals, and to create, enact, and sustain actions towards those goals” and explains that self-regulation should be emphasized when devising a definition for executive functioning.

Analyses on patients who exhibited deficits in managing their thoughts and behaviors as a result of frontal lobe damage, like the classic case of Phineas Gage in the 1840s, led to the overarching conceptualization that EFs are housed in the prefrontal cortex of the brain. However, recent neuroimaging research suggests that various networks throughout the brain are responsible for managing EFs, which makes them more complex than previously believed (Goldstein & Naglieri, 2014). The majority of the research on EFs has been historically focused on how they are involved in clinical conditions and there is an incomparable amount of research done on how they are involved in everyday social circumstances in a healthy population (Barkley, 2012).

One of the higher order processes encompassed in EFs is cognitive flexibility. It is closely associated with creativity, adjustment to changes in demands, and it is characterized by the ability to inhibit a previous perspective and activate a different perspective (Diamond, 2013). The role of cognitive flexibility in mediating automatic behavioral responses makes it a

particularly interesting construct to use in the study of prejudicial attitudes, since it can elucidate whether dexterity in restructuring information afforded by high levels of cognitive flexibility could influence the negative affective evaluations of individuals based on group membership that emerge with prejudice.

In order to be cognitively flexible there must be a disposition to adaptively engage in perspective-taking, especially when individuals with different social identities are involved. Social identity theory (SIT; Tajfel & Turner, 1986) is one of the most renowned theories on intergroup dynamics. SIT maintains that individuals take into account the meaning behind their membership within a social group (ingroup) when encountering individuals from another group (outgroup) (Sheepers & Derks, 2016; Hornsey, 2008). Additionally, the theory posits that the strength of ingroup attachment is related to less appreciation of those in an outgroup (Negy, Shreve, Jensen, & Uddin, 2003). More attachment to the ingroup may be associated with less affability to the outgroup, but it is not clear whether there are other factors that affect both.

Further research is needed to clarify the synergisms between cognitive flexibility and outgroup perceptions that may lead to prejudicial attitudes. The current study aims to establish how changes in cognitive flexibility throughout adulthood may influence ethnic attachment and consequently prejudice.

## THE USES OF THE COGNITIVE FLEXIBILITY CONSTRUCT

A broad definition for cognitive flexibility is an inclination to recognize diverse elements of information and adapt one's behavior in changing contexts (Elen, Stahl, Bromme, & Clarebout, 2011; Spiro & Jehng, 1990). This definition illustrates how fundamental cognitive flexibility may be to change strategies or perspectives in an everyday activity like having a

conversation (Goldstein & Naglieri, 2014). Because the term cognitive flexibility tends to be used loosely, there have been efforts to establish a detailed operational definition for the construct (Chieu, 2007). However, the notion of cognitive flexibility is still somewhat vague and different versions of the general definition are used to address questions on flexible, multifaceted thinking (Elen et al., 2011).

Cognitive flexibility theory (CFT; Spiro & Jehng, 1990) proposes that in “ill-structured domains,” which are scenarios where multiple sources of information must be considered, cognitive flexibility facilitates the restructuring of knowledge as a means to adapt to changes in demand (Spiro & Jehng, 1990). The concept of ill-structured domains is utilized in contexts that involve interacting with complex topics and aim to stimulate thinking that is cognitively flexible (Godshalk, Harvey, & Moller, 2004; Laureiro-Martinez & Stefano, 2018). As a general pedagogical theory, CFT can be seen as a practical instrument for developing adaptable problem-solving strategies.

In the classroom, the premises behind CFT may be manifested through critical thinking tasks, such as, when students are asked to recognize diverse viewpoints. Overgeneralizations and overly simplified explanations for a phenomenon are less likely when the premises of CFT are applied (Spiro & Jehng, 1990). Students would develop a deeper understanding of a complex concept and be prepared to apply the knowledge gained in the ill-structured domain in a variety of ways (Chieu 2007; Spiro & Jehng, 1990).

The literature points to CFT being used as a reliable guide for the design of learning experiences. When learners are prompted to “crisscross” information from different perspectives as means to avoid generalization and rigidity in their thought processes is an example of when

CFT is being applied in a learning environment (Godshalk et al., 2004; Spiro & Jehng, 1990). Extrapolating CFT measures to circumstances where there is not an instructor may be challenging but it may also be substantially beneficial. Lowrey and Soo Kim (2009) suggest that CFT-inspired navigation features in online news platforms can give users a better understanding of news issues and greater aptitude to apply the novel knowledge efficiently in various situations.

Cognitive flexibility also has been repeatedly analyzed in clinical settings. The majority of existing measures of cognitive flexibility has been developed with the intention of addressing the impact that clinical conditions and interventions can have on patients. The Wisconsin Card Sorting Test (WCST), as an example, is a classic neuropsychological task that has been used in studies measuring cognitive flexibility and other EFs in patients with Autism Spectrum Disorder (ASD), the onset of Alzheimer Disease, executive dysfunction as a result of neurological disorders like epilepsy, unipolar depression, and more (MacAllister, et al., 2018; Sánchez & Martín, 2017; Goldstein & Naglieri, 2014). It is a hallmark measure of cognitive flexibility and a classic neuropsychological test for prefrontal cortex function (Diamond, 2013). Participants are asked to correctly identify sorting criteria that change throughout trials for cards that vary may vary in color, shape, or number. However, the psychological distress associated with the WCST can cause increased worries about cognition in older adults that can lead to confounded outcomes (Johnco, Wuthrich, & Rapee, 2014).

Self-report measures on cognitive flexibility have mostly been used to assess elements of psychological well-being. For instance, the Cognitive Flexibility Inventory (CFI; Dennis & Vander Wal, 2010) is a brief questionnaire that was developed with the objective of evaluating the levels of cognitive flexibility that would enable individuals to inhibit maladaptive thoughts

(Dennis & Vander Wal, 2010). Another self-report measure for cognitive flexibility is the Cognitive Flexibility Scale (CFS; Martin & Rubin, 1995) which has been used to study one's awareness of different communication strategies (Martin & Anderson, 1998). Nonetheless, much of the studies that have used the CFS aim to address the subtleties of psychological disorders (Lounes, Khan, & Tchanturia, 2011; Skowron, Fingerhut, & Hess, 2014; Johnco, Wuthrich, & Rapee, 2014).

#### CHANGES IN COGNITIVE FLEXIBILITY THROUGHOUT ADULTHOOD

The maturation of the prefrontal areas of the brain that occurs in the early stages of adulthood is related to increased executive control (Gopnik et al., 2017; Goldstein & Naglieri, 2014). However, the structural and functional changes throughout the brain in the later stages of adulthood lead to declines in EFs in both healthy and cognitively impaired elderly individuals (Gunning-Dixon & Raz, 2003; Goldstein & Naglieri, 2014). Hence, research aiming to counteract deficits in cognitive flexibility and other major EFs through cognitive training in older adults continually gathers attention (Buitenweg, van de Ven, Prinssen, Murre, & Ridderinkhof, 2017; Johnco, Wuthrich, & Rapee, 2013).

The literature also suggests that declines in cognitive flexibility that come with age may be closely tied to molecular changes in the brain. Dopamine is one of the most studied neurotransmitters and it is central to many theories on cognitive aging (Karrer, Josef, Mata, Morris & Samanez-Larkin, 2017). Taking into account that executive function disorders are associated with altered dopamine systems, a study looked at how dopamine synthesis capacity in younger and older adults is correlated with cognitive flexibility assessed via task switching (Berry et al., 2016). The results illustrate that the midrange levels of dopamine in younger adults

and the altered levels of dopamine in older adults may be responsible for the differences in task switching performance.

The fluctuations in cognitive flexibility that are observed in old age are not solely a result of neurobiological changes. Gopnik et al. (2017) argue that the accumulation of knowledge that is achieved once one reaches the later stages of development leads to more confidence in one's beliefs and therefore more attachment to them which can affect plasticity and learning. Parting from a historical perspective, there is research suggesting that older adults' perceptions of racial groups are tied to experiences during a particular point in time (Danigelis & Cutler, 1991). Proponents of this notion suggest that the knowledge gained from a period of time where, for instance, Blacks were portrayed negatively leads to less flexibility in how present-day older adults may perceive this racial group. However, there are competing views proposing that the relationship between prejudice and age is not necessarily influenced by cohort effects but an inability to regulate automatic beliefs (Gonsalkorale, Sherman & Klauer, 2009). The latter premises illustrate the significant role cognitive flexibility may have in mediating prejudicial attitudes in older adults.

A term within developmental psychology that is nearly analogous to cognitive flexibility is perspective-taking. Perspective-taking is defined as the capacity to understand, coordinate and integrate different perspectives (Rakoczy, Wandt, Thomas, Nowak, & Kunzmann, 2018). However, unlike cognitive flexibility the perspective-taking construct does not theorize on adaptation to changes in demand. There are two divergent lines of research addressing how perspective-taking develops in late adulthood: Theory of Mind (ToM) and wisdom (Rakoczy et al., 2018). ToM is defined as the capacity to recognize mental states in the self and others.

Studies on ToM acknowledge that there are variables and limitations in perspective-taking aptitudes among adults and claim that different aspects of ToM show a rather consistent decline with age (Apperly, 2013; Keysar, Lin, & Barr, 2003). Conversely, studies on wisdom maintain that perspective-taking is central to wisdom and wisdom remains generally stable throughout adulthood when controlling for the types of tasks used to evaluate it (Staudinger, 1999; Staudinger & Glueck, 2011).

Results from the study conducted by Rakoczy et al (2018) point to the possibility of age differences in perspective-taking being a function of contextual features of the tasks measuring ToM and wisdom. This study is one of the firsts of its kind as it examines ToM and wisdom conjunctively in younger and older adults. Rakoczy et al (2018) use measures that combine features from the established ToM and wisdom tasks developed by Happé, Winner, and Brownell (1998) and Grossmann, Na, Varnum, Park, Kitayama, and Nisbett (2010), respectively.

Despite there being controversy in how perspective-taking changes in the later stages of development, as a general rule, older adults are often less proficient than younger adults in other elements of cognitive flexibility, such as acquiring and updating information (Wilson, Nusbaum, Whitney & Hinson, 2017). These cognitive differences may have significant implications for the formation of biases and stereotypes across the lifespan. The results from the study by Czarnek and Kossowska (2015) on cognitive flexibility and outgroup stereotypes in younger and older adults indicate that older adults are more likely to analyze stories on outgroup members with stereotypical attitudes. Nonetheless, other research shows that older adults are able to modify their biases, to a greater or lesser extent, through feedback (Cooper, Worthy, & Maddox, 2016; Wilson et al., 2017).

## ETHNIC IDENTITY AND COGNITIVE FLEXIBILITY

Ethnic identity is a product of the identification and membership within an ethnic group (Cuellar, Nyberg, Maldonado, & Roberts, 1997; Negy et al., 2003). Because of the numerous variables that must be considered when delineating ethnic groups (e.g. generation of immigration, social class, mixed backgrounds, cultural norms) there is a nebulous theoretical framework for ethnicity (Phinney, 1996). Moreover, the wide variations in how individuals assimilate to being part of an ethnic group contributes to the complexity of the ethnicity construct. To illustrate, individuals with a weak sense of belonging to their ethnic group may think about their ethnic identity only when prompted to do so, whereas others may be actively involved in the social and cultural practices that characterize their ethnic group (Phinney, 1990).

There is research proposing that having multiple cultural identities is correlated with increased creativity (Steffens, Gocłowska, Cruwys & Galinsky, 2016), a trait that is closely associated with cognitive flexibility (Diamond, 2013; De Dreu, Baas, & Nijstad, 2008). Individuals with dual identities (e.g. Mexican American, secular Buddhist) engage in considerable cognitive efforts in order to maintain a balance between what may be opposing facets of their lives and because of this they may have a wider creative idea base in comparison to individuals with more homogenized backgrounds (Gocłowska & Crisp, 2014). Exposure to more information as a result of having dual or multiple identities is also a factor contributing to these individuals having a wider creative idea base. Steffens et al. (2016) found that while controlling for personality, participants with multiple identities performed better in the Multiple Uses Task and were able to generate more possible names for a new kind of commercial product.

The different stages of ethnic identity development are characterized by oscillations in perspective-taking, which is another indicator for a potential relationship between cognitive flexibility and ethnic identity across the lifespan. The model of minority ethnic identity development (Phinney, 1996) proposes that the questioning and examination of one's ethnicity from adolescence to young adulthood ideally leads to the formation of a stable ethnic identity. In a similar vein, the model of White identity development created by Helms (1990) proposes that a process of questioning and examination leads to awareness of the presumed advantages of being White. It should be recognized, however, that Helms (1990) model does not acknowledge that some Whites may not perceive that they have any privileges because of being White (Myers, Meehan, & Negy, 2008).

#### ETHNIC IDENTITY AND PREJUDICE

Preconceptions that influence the evaluations of and emotional responses towards individuals from different groups are at the core of prejudicial attitudes (Amodio, 2014). One school of thought on prejudice holds that the construct encompasses outgroup rejection and ingroup preference as a means to maximize intergroup saliency (Masson & Verkuyten, 1993). This definition for prejudice is in tandem with the premises behind social identity theory (SIT) which is one of the two main theories on intergroup dynamics. SIT maintains that the desire to differentiate one's group from others is driven by a motivation to enhance group distinctiveness (Negy et al., 2003). Moreover, SIT proposes that sustaining strong ingroup identities comes at the expense of fostering negative biases toward the outgroups.

The multicultural theory of development is the other major theory on intergroup relations and it contends that a secure ethnic identity should be linked to more acceptance of other groups

(Negy et al., 2003). Brewer (1999) argues that the penchant for establishing boundaries between ingroups and the outgroups does not have to result in hostility toward the outgroup. She proposes that ingroup preference is primarily a mechanism for maintaining positive ingroup relationships and this is not always tied to outgroup antagonism. Nonetheless, most of the research to date on intergroup relations supports SIT, the idea that ingroup favoritism and outgroup aversion are closely associated (Tzeng & Jackson, 1994; Negy et al., 2003; Roozen & Shulman, 2014; Korostelina, 2015).

SIT also has support from research in social neuroscience. It is opportune to examine prejudice from a neuroscientific perspective because of the inherent limitations in self-report measures. Scheepers and Derks (2016) outline the research on four core social identity constructs (social categorization, self-group overlap, ingroup bias, and coping with threat) that have been studied with electroencephalography (EEG), functional magnetic resonance imaging (fMRI), and cardiovascular measures. In a study requiring participants to observe images of ingroup and outgroup members feeling sad, it was found that the participants' EEG alpha oscillations for viewing ingroup members feeling sad were similar to the EEG alpha oscillations of when the participants themselves were sad (Gutsell & Inzlicht, 2012). However, the EEG activation patterns for viewing outgroup members feeling sad was significantly different. Moreover, fMRI studies on intergroup relations show that the neural activations of seeing outgroup members suffer are similar to the activation patterns of positive affect, which aligns with the premise of outgroup hostility in SIT (Cikara, Botvinick, Fiske, 2011; Cikara & Fiske, 2011).

## RESEARCH QUESTIONS

The aim of the present study is to examine the interplay between self-reported cognitive flexibility in older and younger adults and prejudicial attitudes towards ethnic outgroups. More specifically, the goal is to determine if cognitive flexibility plays a role in the relationship between attachment to one's ethnic identity (that was operationally defined here as ethnic attachment) and prejudice towards ethnically dissimilar individuals. I anticipated that there will be cohort differences in cognitive flexibility, since this executive function has been shown to decline with age (Diamond, 2013; Berry et al., 2016; Gunning-Dixon & Raz, 2018). Moreover, I conjectured that there will be cohort differences in ethnic attachment due to the contemplation about one's ethnicity that may occur in early adulthood (Phinney, 1996) and the elevated levels of prejudice that have been reported in older adults (Gonsalkorale, Sherman, & Klauer, 2009). If there is an association between cognitive flexibility and prejudice it is expected that they will be inversely related. Moreover, the declines in cognitive flexibility that are expected to be observed among an older cohort may be linked to higher levels of ethnic prejudice in the older adults group compared to the levels of prejudicial attitudes in the younger adults group. The following hypotheses were produced:

H1: Older adults will score lower than younger adults in measures of cognitive flexibility.

H2: Younger adults will score lower than older adults in measures of ethnic attachment.

H3: Cognitive flexibility will be inversely related with prejudice or ethnocentrism.

H4: Cognitive flexibility and ethnic attachment conjointly will predict prejudice in younger and older adults.

## **METHOD**

### **PARTICIPANTS**

The cohort of younger adults included 118 undergraduate students (81 females, 37 males) attending the University of Central Florida. Their mean age = 19.69 yrs. ( $SD = 1.81$ ). Regarding ethnicity, 68 participants self-identified as non-Hispanic White (57.5%), 14 were Asian American (11.9%), 12 were Black or African American (10.2%), 12 were Hispanic or Latino/a (10.2%), 6 were mixed (5.1%), 5 identified as other (4.2%) and 1 was American Indian or Native American (0.8%). Participation was voluntary and participants received extra credit in their respective psychology courses upon completion.

The cohort of older adults was comprised of 95 members (73 females, 22 males) of the Learning Institute for Elders (LIFE) at the University of Central Florida. Their mean age = 71.11 ( $SD = 6.60$ ). Regarding ethnicity, 89 (93.6%) self-identified as non-Hispanic White, 3 (3.2%) as Hispanic or Latino/a, and 3 (3.2%) as other. Recruitment was done via email and participation was voluntary.

### **MEASURES**

#### *DEMOGRAPHIC INFORMATION*

All participants were asked to report: Age, gender, ethnicity, highest level of education obtained by parents, and place of birth.

#### *COGNITIVE FLEXIBILITY INVENTORY*

The self-report measure of cognitive flexibility was the Cognitive Flexibility Inventory (CFI; Dennis & Vander Wal, 2010). The CFI consists of 20 items. Participants indicated their

level of agreement with the statements by using a 7-point Likert-type scale ranging from 1 (“strongly disagree”) to 7 (“strongly agree”). Higher scores reflect higher levels of self-perceived cognitive flexibility. A sample item is “It is important to look at difficult situations from many angles.” Based on the current sample of participants, the CFI demonstrated acceptable levels of reliability (Chronbach alpha = .88).

### *PREJUDICE*

The Multiethnic Climate Inventory (MCI; Johnson & Johnson, 1996) was used to measure levels of prejudice. The MCI consists of 10 items and has a 5-point Likert-type response format with 1 indicating “strongly disagree” and 5 indicating “strongly agree.” Higher scores reflect more generic prejudice against dissimilar groups. A sample item is “I want to live in the same neighborhood only with people who are of my own race or cultural background.” The MCI was selected for administration because items are written in a generic manner in order to assess prejudice in general rather than against a specific group (i.e., the scale—unlike most prejudice scales—is applicable for usage with all ethnic groups (see Negy et al., 2003). Based on the current sample of participants, the MCI demonstrated acceptable levels of reliability (Chronbach alpha = .89).

### *ETHNIC ATTACHMENT*

Participants also completed the Multigroup Ethnic Identity Measure (MEIM; Phinney, 1992) to assess identification and loyalty to their respective ethnic groups. The MEIM consists of 12 statements and has a 4-point Likert-type response format with 1 indicating “strongly

disagree” and 4 indicating “strongly agree.” Higher scores reflect higher levels of attachment to one’s ethnic group. A sample item is “I feel a strong attachment towards my own ethnic group.” Based on the current sample of participants, the MEIM demonstrated acceptable levels of reliability (Chronbach alpha = .87).

### *EMPATHY*

The short version of the Interpersonal Reactivity Index (IRI; Davis, 1980) was used to assess levels of empathy. This is a 7-item measure with a 5-point Likert-type scale where 1 indicates “Does not describe me well” and 5 indicates “Describes me very well.” Higher scores reflect higher levels of empathy. A sample item is “I often have tender, concerned feelings for people less fortunate than me.” Based on the current sample of participants, the IRI demonstrated acceptable levels of reliability (Chronbach alpha = .76).

### *PERSONALITY*

Participants completed the Big Five Inventory for personality (BFI; John & Srivastava, 1999). This scale is comprised of five subscales addressing the following personality domains: Openness, Conscientiousness, Extraversion, Agreeableness and Neuroticism. A 5-point Likert-type scale where 1 indicates “disagree strongly” and 5 indicates “agree strongly” is used across subscales. Each subscale is designed so that higher scores indicate higher levels of each personality trait.

The Openness subscale consists of 10 items. Those who score high on Openness tend to perceive themselves as curious, imaginative, excitable and unconventional (John & Srivastava,

1999). A sample item is “I see myself as someone who is curious about many different things.” Based on the current sample of participants, the Openness subscale of the BFI had acceptable levels of reliability (Chronbach alpha = .73).

The Conscientiousness subscale consists of 9 items. Those who score higher on Conscientiousness tend to perceive themselves as efficient, organized, dutiful and deliberate (John & Srivastava, 1999). A sample item is “I see myself as someone who is a reliable worker.” Based on the current sample of participants, the Conscientiousness subscale of the BFI had acceptable levels of reliability (Chronbach alpha = .79).

The Extraversion subscale consists of 8 items. Those who score higher on Extraversion tend to perceive themselves as gregarious, assertive, energetic and enthusiastic (John & Srivastava, 1999). A sample item is “I see myself as someone who is talkative.” Based on the current sample of participants, the Extraversion subscale of the BFI had acceptable levels of reliability (Chronbach alpha = .87).

The Agreeableness subscale consists of 9 items. Those who score higher on Agreeableness tend to perceive themselves as forgiving, not demanding, warm and modest (John & Srivastava, 1999). A sample item is “I see myself as someone who is helpful and unselfish with others.” Based on the current sample of participants, the Agreeableness subscale of the BFI had acceptable levels of reliability (Chronbach alpha = .78).

The Neuroticism subscale consists of 8 items. Those who score higher on Neuroticism tend to perceive themselves as irritable, shy, moody, and vulnerable (John & Srivastava, 1999). A sample item is “I see myself as someone who worries a lot.” Based on the current sample of participants, the Neuroticism subscale had acceptable levels of reliability (Chrobach alpha = .84).

### *OPTIMISM*

To assess optimism, participants completed the Revised Life Orientation Test (LOT-R; Scheier, Carver, & Bridge, 1994). The LOT-R has 10 items (3 measure optimism, 3 measure pessimism, and 4 serve as filler items). Respondents indicate their level of agreement with statements by using a 4-point Likert-type scale format, with response options ranging from 0 (“strongly disagree”) to 4 (“strongly agree”). Higher scores reflect higher levels of optimism. A sample item is “Overall, I expect more good things to happen to me than bad.” Based on the current sample of participants, the LOT-R demonstrated acceptable levels of reliability (Chronbach alpha = .81).

### *SOCIAL DESIRABILITY*

Participants completed the Marlow-Crowne Social Desirability Scale (MCSDS; Crowne & Marlowe, 1960) to evaluate their levels of social desirability. The MCSDS consists of 13 items and a 5-point Likert-type scale where 1 indicates “strongly disagree” and 5 indicates “strongly agree.” This measure is widely used to validate other measures and has been shown to be reliable (Vésteindóttir, Reips, Joinson & Thorsdottir, 2015). Higher scores reflect a greater tendency to present oneself in a socially favorable manner. A sample item is “I am always courteous, even to people who are disagreeable.” Based on the current sample of participants, the MCSDS demonstrated acceptable levels of reliability (Chronbach alpha = .76).

## PROCEDURE

Both cohorts of participants were given a link to access the set of questionnaires on the Qualtrics survey platform. Participants were informed that they are going to take part in a research study examining cognitive flexibility and ethnic identity. Younger adults accessed the survey via the Psychology Research Participation System of the University of Central Florida called SONA and received credit for their participation in their psychology courses. Older adults received the link to the questionnaire via email and completed the survey on a voluntary basis. Older adults were informed they would not receive compensation for their participation before completing the survey.

## RESULTS

### COGNITIVE FLEXIBILITY IN YOUNGER VERSUS OLDER ADULTS

Tables 1 and 2 show the means and standard deviations of all study variables for the younger and older adult cohorts, respectively. The first hypothesis was that younger adults would score higher on a measure of cognitive flexibility than older adults. Contrary to the prediction, the results indicated that older adults scored significantly higher on cognitive flexibility ( $M = 5.66$ ,  $SD = .55$ ) than younger adults ( $M = 5.36$ ,  $SD = .68$ ) (using an analysis of variance [ANOVA],  $F [1, 211] = 11.85$ ,  $p < .001$ ,  $\eta^2 = .05$ ). However, when social desirability was included in the analysis as a covariate, older adults' scores on cognitive flexibility no longer differed significantly from those of younger adults (using an analysis of covariance [ANCOVA]  $F [1, 207] = 2.98$ ,  $p > .05$ ,  $\eta^2 = .01$ ).

### ETHNIC ATTACHMENT IN YOUNGER VERSUS OLDER ADULTS

The second hypothesis was that younger adults would score lower than older adults on ethnic attachment. The hypothesis was not supported. Younger adults' scores on ethnic attachment ( $M = 2.25$ ,  $SD = .52$ ) did not differ significantly from older adults' scores ( $M = 2.30$ ,  $SD = .39$ ),  $F [1, 210] = .46$ ,  $p > .05$ ,  $\eta^2 = .00$ . Inclusion of social desirability into the analysis did not change the results ( $F [1, 207] = .65$ ,  $p > .05$ ,  $\eta^2 = .00$ ).

### PREJUDICE AND COGNITIVE FLEXIBILITY

The third hypothesis was that there would be a significant negative correlation between cognitive flexibility and prejudice. To test this hypothesis, bivariate correlations between cognitive flexibility and prejudice were conducted; partial bivariate correlations controlling for social desirability also were conducted (see Tables 3 and 4). The hypothesis was not fully

supported. The results revealed a significant and negative correlation between cognitive flexibility and prejudice for younger adults only ( $r = -.20, p < .05$ ). Although in the expected direction, the correlation between cognitive flexibility and prejudice did not achieve statistical significance for older adults ( $r = -.08, p > .05$ ). With social desirability partialled, the correlations between cognitive flexibility and prejudice were not significant for either younger adults ( $r = -.13, p > .05$ ) or older adults ( $r = -.05, p > .05$ ).

#### COGNITIVE FLEXIBILITY, ETHNIC ATTACHMENT, AND PREJUDICE

The fourth hypothesis was that cognitive flexibility and ethnic attachment would conjointly predict prejudice. To test this hypothesis, a standard multiple regression analysis was conducted separately by cohort. Predictor variables were cognitive flexibility and ethnic attachment. Social desirability was force-entered at step one of the equation. The hypothesis was supported for younger adults only (See tables C1 and C2). Among younger adults, the prediction was significant (Multiple  $R^2 = .15, F [3,113] = 6.25, p < .01$ ). Univariate tests showed that both cognitive flexibility and ethnic attachment independently contributed to the prediction of prejudice ( $t$ -tests = -2.35 and -3.32,  $ps < .05$  and  $.01$ , respectively). However, cognitive flexibility and ethnic attachment conjointly did not significantly predict prejudice among older adults (Multiple  $R^2 = .05, F [3, 90] = 1.60, p > .05$ ).

#### EXPLORATORY ANALYSES WITH ADDITIONAL STUDY VARIABLES

Although not part of the formal hypotheses, I had measured various personality variables to determine if they correlated with cognitive flexibility. Specifically, I had included the subscales of the Big Five Personality test (Openness, Conscientiousness, Extraversion, Agreeableness, Neuroticism) as well as Empathy and Optimism. Tables 3 and 4 shows the

bivariate correlations between these personality variables and cognitive flexibility. Observation of the tables indicates that various personality variables correlated significantly with cognitive flexibility. For young adults, the variables that correlated significantly with cognitive flexibility were: Openness ( $r = .35, p < .01$ ), Conscientiousness ( $r = .52, p < .01$ ), Extraversion ( $r = .34, p < .01$ ), Agreeableness ( $r = .34, p < .01$ ), Neuroticism ( $r = -.39, p < .01$ ), and Optimism ( $r = .31, p < .01$ ) (See Table B1). For older adults, the variables that correlated significantly with cognitive flexibility were: Openness ( $r = .46, p < .01$ ), Conscientiousness ( $r = .20, p < .05$ ), Agreeableness ( $r = .22, p < .05$ ), and Neuroticism ( $r = -.26, p < .05$ ) (See Table B2)

## DISCUSSION

The primary objective of the present study was to examine the relation between cognitive flexibility and prejudice. Older adults served as a comparative group as means to assess whether the natural declines in cognition that come with age and the concomitant rigidity in thinking would be associated with higher levels of prejudicial attitudes.

The first hypothesis was that older adults would score lower than younger adults on cognitive flexibility. However, the data did not support this hypothesis. Younger and older participants did not differ significantly in cognitive flexibility. The premise behind this hypothesis was based on previous studies showing that older adults experience molecular and functional changes in the brain that lead to lower levels of cognitive flexibility (Berry et al., 2016; Gunning-Dixon & Raz, 2018; Diamond, 2013). A chief commonality among previous research is that they assessed cognitive flexibility using performance-based measures. Task-switching abilities that depend on high levels of processing speed and adaptive responses to novel stimuli are examined in the majority of tests for cognitive flexibility (Gunning-Dixon & Raz, 2003). Those performance-based measures overlook the knowledge and expertise that many older participants may have which can be equally important when assessing cognitive flexibility (Chieu 2007; Spiro & Jehng, 1990). Johnco, Wuthrich, and Rapee (2014) have raised concerns that performance-based types of tests may threaten older people, leading to poorer performance due to anxiety. For my study, all participants were asked to self-evaluate their *perceived* cognitive flexibility. This type of assessment is believed to measure perceived cognitive styles rather than cognitive dexterities. As such, the measure of perceived cognitive flexibility used in this study likely did **not** induce any levels of anxiety among respondents.

Convergent validity between self-report measures of cognitive flexibility has been found, but there is little to no relationship between neuropsychological and self-report measures of the construct (Johnco, Wuthrich, & Rapee, 2014). A subjective, self-report measure of cognitive flexibility—one that requires respondents to report their own perceptions of how flexible they are—was used in this study to facilitate administration. The lack of observed differences in cognitive flexibility scores between my two cohorts may be an artifact of the fact that my measure assessed self-perceptions of cognitive flexibility rather than cognitive flexibility per se. Explaining why self-report and neuropsychological measures of cognitive flexibility are not related may be possible by expanding upon the research aiming to assess the neural underpinnings of this function (Shamay-Tsoory et al., 2004). In doing so, it would be possible to determine the extent to which individuals are capable of judging accurately their levels of cognitive flexibility.

I also had hypothesized that younger adults would be significantly less attached to their ethnic identity than older adults. The rationale underlying this hypothesis was based on studies showing that older adults tend to be more prejudiced than younger cohorts because of reduced inhibitory control (Gonsalkorale, Sherman & Klauer, 2009). Because ethnic attachment may prelude prejudicial attitudes (Tajfel & Turner, 1986; Negy et al., 2003), I reasoned that older adults would score higher than younger adults in ethnic attachment. Moreover, younger adults are more likely to be in a stage of development where they contemplate more about their ethnic identity (Phinney, 1996) and may therefore show less attachment to this facet of the self. This hypothesis was not supported. Younger adults did not differ from older adults in their levels of ethnic attachment. In the absence of additional data, it is difficult to know with certainty why the

two cohorts had comparable levels of ethnic attachment. One possible explanation is that the present sample of older adults are highly involved in the community and thus, presumably open to new experiences and people. The city of Orlando is diverse, with approximately equal percentages of three main ethnic groups (38% are White, 30% are Hispanic or Latino/a, and 26% are African Americans [U.S. Census, 2018]). The older adults may have ample social interactions with people from distinct backgrounds, and consequently, may not feel any more attached to their own ethnicity than a sample of younger adults.

I also had hypothesized that cognitive flexibility would correlate negatively with prejudice. This hypothesis was only partially supported. The negative correlation between prejudice and cognitive flexibility was significant for younger adults, but not significant for older adults. However, after controlling for social desirability, the correlation between these constructs in younger adults was no longer significant and remained non-significant for older adults. These results can be at least partly explained by considering that motives to show unbiased attitudes towards different ethnic groups can lead to altered or inhibited expressions of prejudice (Gonsalkorale, Sherman, & Klauer, 2009). This may be especially true for older adults. Growing up in an era when negative evaluations of dissimilar individuals were tolerated and experiencing societal shifts that now make these attitudes unacceptable may have influenced how older participants in this study expressed in their ratings their levels prejudice. Consequently, the strength of the correlation between prejudice and cognitive flexibility could have been attenuated in this cohort.

The fourth hypothesis of this study was an extension of the third hypothesis. Namely, it was hypothesized that cognitive flexibility and ethnic attachment would conjointly predict

prejudice. This hypothesis was supported for young adults, but not for older adults. With the response set of social desirability controlled for, the two constructs taken together predicted significantly prejudice among young adults. Moreover, each construct independently contributed to the prediction of prejudice for young adults (cognitive flexibility and ethnic attachment both negatively correlated with prejudice for young adults). However, the predictor variables did not conjointly predict prejudice among older adults. I note here that the obtained correlations between the three constructs were relatively weak in absolute terms despite having achieved statistical significance for young adults. Perhaps that may explain the lack of overall significance among older adults. Also, variables other than cognitive flexibility and ethnic attachment may be better predictors of prejudice in older adults. The significant finding among young adults is consistent with other studies showing that ethnic attachment is linked with less prejudice (see Romero & Roberts, 1998). This finding also is consistent with multicultural theory (Arredondo et al., 1996).

Prejudice is a complex behavior. It has cognitive as well as emotional underpinnings and its manifestation substantially depends on personal goals and societal expectations (Amodio, 2014). Cognitive flexibility is characterized by the ability to adapt to changes in demand and alter perspectives (Diamond, 2013). At face value, these constructs should be inversely related. Negative evaluations and affective responses towards those in the outgroup are putatively associated with the capacity to avoid rigid thinking regarding dissimilar individuals. However, theoretically, cognitive flexibility may be more strongly associated with the ability to overcome prejudices—something that was not captured in the measure of prejudice used—as opposed to merely being prejudiced (Gonsalkorale, Sherman, & Klauer, 2009).

Bivariate correlations between all study variables were done as part of exploratory analyses. For both sample cohorts, various Big Five personality traits correlated (and in expected directions) with cognitive flexibility. As one example, scores on Openness (being open to new experiences and situations) correlated positively and significantly with cognitive flexibility. Of course, given the correlational nature of these findings, it is unknown if openness increases causally cognitive flexibility or if cognitive flexibility causally increases being open to new experiences. Naturally, the two variables may be mutually influential, or even measuring the same construct. Nonetheless, the myriad observed correlations between cognitive flexibility and the Big Five personality traits is an area ripe for further exploration in future studies.

#### LIMITATIONS

This study has limitations worthy of noting. Cognitive flexibility was not truly measured, only respondents' self-perceptions of how cognitively flexible were measured. Despite controlling for socially desirable responding, even if my participants were being honest in their self-appraisals, they were being honest in their opinions about their cognitive flexibility, not actually measuring their own flexibility. That problem relates to another limitation regarding measuring prejudice. No matter the extent researchers try to measure accurately individuals' level of prejudice, the U.S. social taboo about not being prejudiced theoretically would cause participants to downplay the greatest extent possible any negative views they may harbor toward dissimilar others. Thus, the scores on prejudice in this study may or may not reflect reality. Finally, both of my samples are not representative of people in the general public. Most U.S. residents have not graduated from a university and most older adults are not participating in university-based educational programs.

## CONCLUSION

The relation between cognitive flexibility and prejudice may be different in younger and older adults. Curiously, and contrary to expectations, older adults in my study perceived themselves as more cognitively flexible than younger adults and there were no significant differences in ethnic attachment between cohorts. As predicted, the correlation between cognitive flexibility and prejudice was significant and negative, but only among young adults. Even then, that observed correlation became non-significant after controlling for social desirability. Cognitive flexibility and ethnic attachment significantly predicted prejudice when examined conjointly in younger adults only. Additionally, exploratory analyses revealed that cognitive flexibility correlated with the personality constructs measured by the Big Five Personality test, thereby paving the way for new studies to be pursued in that area.

## **APPENDIX A: SCORES ON MEASURES**

**Table A1.** Means and Standard Deviations of Study Variables in Younger Adults (N = 118)

<i>VARIABLE</i>	<i>M</i>	<i>SD</i>
CFI <sup>1</sup>	5.36	.68
Prejudice <sup>2</sup>	1.82	.71
Ethnic Attachment <sup>3</sup>	2.25	.52
Empathy <sup>4</sup>	3.90	.73
Openness <sup>5</sup>	3.69	.53
Conscientiousness <sup>6</sup>	3.70	.58
Extraversion <sup>7</sup>	3.29	.84
Agreeableness <sup>8</sup>	3.69	.53
Neuroticism <sup>9</sup>	2.95	.88
Optimism <sup>10</sup>	3.42	.87
Social Desirability <sup>11</sup>	3.24	.52

Notes:

<sup>1</sup> CFI = Cognitive Flexibility Scale (CFI; Dennis & Vander Wal, 2010).

<sup>2</sup> Multiethnic Climate Inventory (MCI; Johnson & Johnson, 1996).

<sup>3</sup> Multigroup Ethnic Identity Measure (MEIM; Phinney, 1992).

<sup>4</sup> Interpersonal Reactivity Index (IRI; Davis, 1980).

<sup>5</sup> Openness subscale of the Big Five Inventory (BFI; John & Srivastava, 1999).

<sup>6</sup> Conscientiousness subscale of the Big Five Inventory (BFI; John & Srivastava, 1999).

<sup>7</sup> Extraversion subscale of the Big Five Inventory (BFI; John & Srivastava, 1999).

<sup>8</sup> Agreeableness subscale of the Big Five Inventory (BFI; John & Srivastava, 1999).

<sup>9</sup> Neuroticism subscale of the Big Five Inventory (BFI; John & Srivastava, 1999).

<sup>10</sup> Optimism measured by the Life Orientation Test Revised (LOT-R; Scheier, Carver & Bridge, 1994).

<sup>11</sup> Social Desirability measured by the Marlow-Crowne Social Desirability short form (Crowne & Marlow, 1960).

**Table A2.** Means and Standard Deviations of Study Variables in Older Adults (N = 95)

<i>VARIABLE</i>	<i>M</i>	<i>SD</i>
CFI <sup>1</sup>	5.66	0.55
Prejudice <sup>2</sup>	1.69	0.61
Ethnic Attachment <sup>3</sup>	2.30	0.39
Empathy <sup>4</sup>	4.11	0.70
Openness <sup>5</sup>	3.81	0.56
Conscientiousness <sup>6</sup>	4.11	0.57
Extraversion <sup>7</sup>	3.10	0.80
Agreeableness <sup>8</sup>	4.22	0.52
Neuroticism <sup>9</sup>	2.44	0.59
Optimism <sup>10</sup>	3.96	0.73
Social Desirability <sup>11</sup>	3.58	0.53

Notes:

<sup>1</sup> CFI = Cognitive Flexibility Scale (CFI; Dennis & Vander Wal, 2010).

<sup>2</sup> Multiethnic Climate Inventory (MCI; Johnson & Johnson, 1996).

<sup>3</sup> Multigroup Ethnic Identity Measure (MEIM; Phinney, 1992).

<sup>4</sup> Interpersonal Reactivity Index (IRI; Davis, 1980).

<sup>5</sup> Openness subscale of the Big Five Inventory (BFI; John & Srivastava, 1999).

<sup>6</sup> Conscientiousness subscale of the Big Five Inventory (BFI; John & Srivastava, 1999).

<sup>7</sup> Extraversion subscale of the Big Five Inventory (BFI; John & Srivastava, 1999).

<sup>8</sup> Agreeableness subscale of the Big Five Inventory (BFI; John & Srivastava, 1999).

<sup>9</sup> Neuroticism subscale of the Big Five Inventory (BFI; John & Srivastava, 1999).

<sup>10</sup> Optimism measured by the Life Orientation Test Revised (LOT-R; Scheier, Carver & Bridge, 1994).

<sup>11</sup> Social Desirability measured by the Marlow-Crowne Social Desirability short form (Crowne & Marlow, 1960).

## **APPENDIX B: BIVARIATE CORRELATIONS**

**Table B1.** Bivariate Correlations Among all Study Variables in Younger Adults (N = 118)

<i>VARIABLE</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) CFI	1										
(2) Prejudice	-.20*	1									
(3) Ethnic Attachment	-.32**	-.21*	1								
(4) Empathy	.11	-.08	-.12	1							
(5) Openness	.35**	.08	-.21*	.18	1						
(6) Conscientiousness	.52**	-.11	-.17	.22*	.10	1					
(7) Extraversion	.34**	-.06	-.15	.06	.23*	.17	1				
(8) Agreeableness	.34**	-.26**	-.18	.54**	.16	.50**	.21*	1			
(9) Neuroticism	-.39**	.18	.12	.22*	-.02	-.30**	-.28**	-.26**	1		
(10) Optimism	.31**	.17	-.17	.17	.29**	.18	.27**	.15	-.26**	1	
(11) Social Desirability	.37**	-.23*	-.13	.18	.08	.45**	.19*	.55**	-.28**	-.02	1

Notes: \*  $p < .05$  \*\*  $p < .01$ .

(1) CFI = Cognitive Flexibility Scale (CFI; Dennis & Vander Wal, 2010). (2) Multiethnic Climate Inventory (MCI; Johnson & Johnson, 1996). (3) Multigroup Ethnic Identity Measure (MEIM; Phinney, 1992). (4) Interpersonal Reactivity Index (IRI; Davis, 1980). (5) Openness subscale of the Big Five Inventory (BFI; John & Srivastava, 1999). (6) Conscientiousness subscale of the Big Five Inventory (BFI; John & Srivastava, 1999). (7) Extraversion subscale of the Big Five Inventory (BFI; John & Srivastava, 1999). (8) Agreeableness subscale of the Big Five Inventory (BFI; John & Srivastava, 1999). (9) Neuroticism subscale of the Big Five Inventory (BFI; John & Srivastava, 1999). (10) Optimism measured by the Life Orientation Test Revised (LOT-R; Scheier, Carver & Bridge, 1994). (11) Social Desirability measured by the Marlow-Crowne Social Desirability short form (Crowne & Marlow, 1960).

**Table B2.** Bivariate Correlations Among all Study Variables in Older Adults (N = 95)

<i>VARIABLE</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) CFI	1										
(2) Prejudice	-.08	1									
(3) Ethnic Attachment	-.03	-.20	1								
(4) Empathy	.32*	-.14	-.15	1							
(5) Openness	.46**	-.11	-.14	.29*	1						
(6) Conscientiousness	.20*	.17	.03	.26*	.01	1					
(7) Extraversion	.18	-.06	.00	.38**	.42**	.08	1				
(8) Agreeableness	.22*	-.17	-.02	.60**	.25*	.16	.23*	1			
(9) Neuroticism	-.26*	-.18	-.11	-.15	-.08	-.32**	-.03	-.34**	1		
(10) Optimism	.16	-.11	.11	.17	.15	.15	.13	.30**	-.45**	1	
(11) Social Desirability	.32**	-.10	.11	.22	.19	.42**	.10	.46**	-.30**	.18	1

Notes: \*  $p < .05$  \*\*  $p < .01$ .

(1) CFI = Cognitive Flexibility Scale (CFI; Dennis & Vander Wal, 2010). (2) Multiethnic Climate Inventory (MCI; Johnson & Johnson, 1996). (3) Multigroup Ethnic Identity Measure (MEIM; Phinney, 1992). (4) Interpersonal Reactivity Index (IRI; Davis, 1980). (5) Openness subscale of the Big Five Inventory (BFI; John & Srivastava, 1999). (6) Conscientiousness subscale of the Big Five Inventory (BFI; John & Srivastava, 1999). (7) Extraversion subscale of the Big Five Inventory (BFI; John & Srivastava, 1999). (8) Agreeableness subscale of the Big Five Inventory (BFI; John & Srivastava, 1999). (9) Neuroticism subscale of the Big Five Inventory (BFI; John & Srivastava, 1999). (10) Optimism measured by the Life Orientation Test Revised (LOT-R; Scheier, Carver & Bridge, 1994). (11) Social Desirability measured by the Marlow-Crowne Social Desirability short form (Crowne & Marlow, 1960).

## **APPENDIX C: REGRESION ANALYSES**

**Table C1.** Cognitive Flexibility and Ethnic Attachment Predicting Prejudice in Younger Adults

<b>Model Summary</b>				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.209 <sup>a</sup>	.044	.035	.69853
2	.382 <sup>b</sup>	.146	.122	.66624

a. Predictors: (Constant), SocialDesireTOT

b. Predictors: (Constant), SocialDesireTOT, EthnicIdentityTOT, CogFlexInvTOT

<b>ANOVA<sup>a</sup></b>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.495	1	2.495	5.114	.026 <sup>b</sup>
	Residual	54.650	112	.488		
	Total	57.145	113			
2	Regression	8.319	3	2.773	6.247	.001 <sup>c</sup>
	Residual	48.826	110	.444		
	Total	57.145	113			

a. Dependent Variable: PrejudiceTOT

b. Predictors: (Constant), SocialDesireTOT

c. Predictors: (Constant), SocialDesireTOT, EthnicIdentityTOT, CogFlexInvTOT

<b>Coefficients<sup>a</sup></b>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.780	.422		6.584	.000
	SocialDesireTOT	-.293	.129	-.209	-2.261	.026
2	(Constant)	4.808	.708		6.788	.000
	SocialDesireTOT	-.223	.133	-.160	-1.679	.096
	CogFlexInvTOT	-.244	.104	-.234	-2.353	.020
	EthnicIdentityTOT	-.419	.126	-.309	-3.323	.001

a. Dependent Variable: PrejudiceTOT

**Table C2.** Cognitive Flexibility and Ethnic Attachment Predicting Prejudice in Older Adults

<b>Model Summary</b>				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.106 <sup>a</sup>	.011	.000	.62020
2	.229 <sup>b</sup>	.052	.020	.61410

a. Predictors: (Constant), SocialDesireTOT

b. Predictors: (Constant), SocialDesireTOT, EthnicIdentityTOT, CogFlexInvTOT

<b>ANOVA<sup>a</sup></b>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.387	1	.387	1.007	.318 <sup>b</sup>
	Residual	34.234	89	.385		
	Total	34.621	90			
2	Regression	1.812	3	.604	1.602	.195 <sup>c</sup>
	Residual	32.809	87	.377		
	Total	34.621	90			

a. Dependent Variable: PrejudiceTOT

b. Predictors: (Constant), SocialDesireTOT

c. Predictors: (Constant), SocialDesireTOT, EthnicIdentityTOT, CogFlexInvTOT

<b>Coefficients<sup>a</sup></b>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.153	.446		4.825	.000
	SocialDesireTOT	-.123	.123	-.106	-1.003	.318
2	(Constant)	3.199	.802		3.989	.000
	SocialDesireTOT	-.067	.129	-.057	-.516	.607
	CogFlexInvTOT	-.096	.124	-.086	-.778	.439
	EthnicIdentityTOT	-.307	.168	-.192	-1.827	.071

a. Dependent Variable: PrejudiceTOT

## REFERENCES

- Amodio, D.M. (2014). The neuroscience of prejudice and stereotypes. *Nature Reviews Neuroscience, 15*, 670-682.
- Arredondo, P., Toporek, R., Brown, S. P., Jones, J., Locke, D. C, Sanchez, J., & Stadler, H. (1996). Operationalization of the multicultural counseling competencies. *Journal of Multicultural Counseling and Development, 24*, 42–78. doi:10.1002/j.2161-1912.1996.tb00288.x
- Apperly, I. (2013). Can theory of mind grow up? Mindreading in adults, and its implications for the development and neuroscience of mindreading. In S. Baron-Cohen, H. Tager-Flusberg & M. V. Lombardo (Eds.), *Understanding other minds: Perspectives from developmental social neuroscience* (3rd ed.) (pp. 72–92). New York, NY: Oxford University Press.
- Cikara, M., Botvinick, M. M., & Fiske, S. T. (2011). Us versus them: social identity shapes neural responses to intergroup competition and harm. *Psychological Science, 22*, 306-313.
- Cikara M, & Fiske S. T. (2011). Bounded empathy: neural responses to outgroup targets' misfortunes. *Journal of Cognitive Neuroscience, 23*, 3791- 3803.
- Barkley, R.A. (2012). *Executive Functions*. New York, NY: Guilford Press.
- Berry, A. S., Shah, V. D., Baker, S. L., O'Neil, J. P., Janabi, M., Jagust, W. J., & ... Marks, S. M. (2016). Aging Affects Dopaminergic Neural Mechanisms of Cognitive Flexibility. *Journal of Neuroscience, 36*(50), 12559-12569.
- Brewer, M. B. (1999). The psychology of prejudice: Ingroup love or outgroup hate?. *Journal Of*

*Social Issues*, 55(3), 429-444. doi:10.1111/0022-4537.00126

Buitenweg, J. V., van de Ven, R. M., Prinssen, S., Murre, J. J., & Ridderinkhof, K. R. (2017).

Cognitive flexibility training: A large-scale multimodal adaptive active-control intervention study in healthy older adults. *Frontiers in Human*

*Neuroscience*, 11doi:10.3389/fnhum.2017.00529

Cooper, J. A., Worthy, D. A., & Maddox, W. T. (2016). Information about foregone rewards

impedes dynamic decision-making in older adults. *Aging, Neuropsychology, and*

*Cognition*, 23, 103-116. doi:10.1080/13825585.2015.1052364

Cuellar, I., Nyberg, B., Maldonado, E., & Roberts, R. (1997). Ethnic identity and acculturation in

a young adult Mexican-origin population. *Journal of Community Psychology*, 25, 535–

549.

Crowne, D. P. and Marlowe, D. (1960). A scale of social desirability independent of

psychopathology. *Journal of Consulting Psychology*, 24, 349-354.

Czarnek, G., Kossowska, M., & Sedek, G. (2015). The influence of aging on outgroup

stereotypes: The mediating role of cognitive and motivational facets of deficient

flexibility. *Experimental Aging Research*, 41, 303-324.

doi:10.1080/0361073X.2015.1021647

Davis, M. H. (1980). A multidimensional approach to individual differences in empathy.

*JSAS Catalog of Selected Documents in Psychology*, 10, 85.

De Dreu, C. K., Baas, M., & Nijstad, B. A. (2008). Hedonic tone and activation level in the

mood-creativity link: toward a dual pathway to creativity model. *Journal of Personality*

*and Social Psychology*, 94, 739-756.

- Dennis, J. P., Vander Wal, J. S. (2010). The Cognitive Flexibility Inventory: Instrument Development and Estimates of Reliability and Validity. *Cognitive Therapy Research*, 34, 241-253.
- Diamond, A. (2013). Executive Functions. *Annual Reviews Psychology*, 64, 135-168.
- Elen, J., Stahl, E., Bromme, R., & Clarebout, G. (2011). *Links Between Beliefs and Cognitive Flexibility*. Springer.
- Gołowska, M. A., & Crisp, R. J. (2014). How dual identity processes foster creativity. *Review of General Psychology*, 18, 216-236.
- Godshalk, V. M., Harvey, D. M., & Moller, L. (2004). The Role of Learning Tasks on Attitude Change Using Cognitive Flexibility Hypertext Systems. *Journal of The Learning Sciences*, 13, 507-526.
- Goldstein, S., & Naglieri, J. A. (2014). *Handbook of executive functioning*. Springer.
- Gonsalkorale, K., Sherman, J.W., & Klauer, K.C. (2009). Measures of Implicit Attitudes May Conceal Differences in Implicit Associations: The Case of Antiaging Bias. *Social Psychological and Personality Science*, 5(3), 271-278.
- Gopnik, A., O'Grady, S., Lucas, C. G., Griffiths, T. L., Wente, A., Bridgers, S., & ... Dahl, R. E. (2017). Changes in cognitive flexibility and hypothesis search across human life history from childhood to adolescence to adulthood. *PNAS Proceedings of The National Academy of Sciences of The United States of America*, 114(30), 7892-7899.  
doi:10.1073/pnas.1700811114
- Grossmann, I., Na, J., Varnum, M. E., Park, D. C., Kitayama, S., & Nisbett, R. E. (2010).

- Reasoning about social conflicts improves into old age. *Proceedings of the National Academy of Sciences of the United States of America*, *107*, 7246–7250.
- Gunning-Dixon, F. M., & Raz, N. (2003). Neuroanatomical correlates of selected executive functions in middle-aged and older adults: A prospective MRI study. *Neuropsychologia*, *41*, 1929–1941.
- Gutsell, J. N., & Inzlicht, M. (2012). Intergroup differences in the sharing of emotive states: Neural evidence of an empathy gap. *Social Cognitive and Affective Neuroscience*, *7*, 596-603. doi:10.1093/scan/nsr035
- Happ e, F. G. E., Winner, E., & Brownell, H. (1998). The getting of wisdom: Theory of mind in old age. *Developmental Psychology*, *34*, 358–362.
- Helms, J. (1990). *Black and White racial identity: Theory, research, and practice*. New York: Greenwood.
- Hornsey, M.J. (2008). Social Identity Theory and Self-categorization Theory: A Historical Review. *Social and Personality Psychology Compass*, *2*, 204-222.
- John, O. P., & Srivastava, S. (1999). The Big-Five trait taxonomy: History, measurement, and theoretical perspectives. *Handbook of personality: Theory and research*, *2*, 102–138.
- Johnco, C., Wuthrich, V., & Rapee, R. (2013). The role of cognitive flexibility in cognitive restructuring skill acquisition among older adults. *Journal of Anxiety Disorders*, *27*, 576-584. doi:10.1016/j.janxdis.2012.10.004
- Johnco, C., Wuthrich, V. M., & Rapee, R. M. (2014). The influence of cognitive flexibility on

- treatment outcome and cognitive restructuring skill acquisition during cognitive behavioural treatment for anxiety and depression in older adults: Results of a pilot study. *Behaviour Research and Therapy*, 57, 55-64. doi:10.1016/j.brat.2014.04.005
- Johnco, C., Wuthrich, V. M., & Rapee, R. M. (2014). Reliability and Validity of Two Self-Report Measures of Cognitive Flexibility. *Psychological Assessment*, 26(4), 1381-1387.
- Johnson, P. E., & Johnson, R. E. (1996). The role of concrete–abstract thinking levels in teachers’ multiethnic beliefs. *Journal of Research and Development in Education*, 29, 134–140.
- Karrer, T. M., Josef, A. K., Mata, R., Morris, E. D., & Samanez-Larkin, G. R. (2017). Reduced dopamine receptors and transporters but not synthesis capacity in normal aging adults: A meta-analysis. *Neurobiology of Aging*, 5736-46. doi:10.1016/j.neurobiolaging.2017.05.006
- Keysar, B., Lin, S. H., & Barr, D. J. (2003). Limits on theory of mind use in adults. *Cognition*, 89, 25–41. doi:10.1016/S0010-0277(03)00064-7
- Khera, M. L. K., Harvey, A. J., & Callan, M. J. (2014). Beliefs in a just world, subjective well-being and attitudes towards refugees among refugee workers. *Social Justice Research*, 27, 432-443. <http://dx.doi.org/10.1007/s11211-014-0220-8>
- Korostelina, K. (2015). Reproduction of conflict in history teaching in Ukraine: A social identity theory analysis. *Identity: An International Journal of Theory And Research*, 15, 221-240. doi:10.1080/15283488.2015.1057283
- Laureiro-Martínez, D., & Brusoni, S. (2018). Cognitive flexibility and adaptive decision-making: Evidence from a laboratory study of expert decision makers. *Strategic Management*

*Journal*, 39, 1031-1058. doi:10.1002/smj.2774

Lounes, N., Khan, G., & Tchanturia, K. (2011). Assessment of cognitive flexibility in anorexia nervosa—Self-report or experimental measure? A brief report. *Journal of The International Neuropsychological Society*, 17, 925-928.

doi:10.1017/S1355617711000671

Lowrey, W., & Soo Kim, K. (2009). Online News Media and Advanced Learning: A Test of Cognitive Flexibility Theory. *Journal of Broadcasting & Electronic Media*, 53, 547-566.

MacAllister, W. S., Maiman, M., Marsh, M., Whitman, L., Vasserman, M., Cohen, R. J., & Salinas, C. M. (2018). Sensitivity of the Wisconsin Card Sorting Test (64-Card Version) versus the Tower of London (Drexel Version) for detecting executive dysfunction in children with epilepsy. *Child Neuropsychology*, 24, 354-369.

doi:10.1080/09297049.2016.1265101

Martin, M., & Anderson, C.M. (1998). The Cognitive Flexibility Scale: Three Validity Studies. *Communication Reports*, 11, 1-9.

Martin, M. M., & Rubin, R. B. (1995). A new measure of cognitive flexibility. *Psychological Reports*, 76, 623-626. <http://dx.doi.org/10.2466/pr0.1995.76.2.623>

Myers, C. A., Meehan, D. C. M., & Negy, C. (2008). Caucasian (White) Americans: The forging of an identity and culture. In C. Negy (Ed.), *Cross-cultural psychotherapy: Toward a critical understanding of diverse clients* (2<sup>nd</sup> ed.), (pp. 187-206). Reno, NV: Bent Tree Press, Inc.

Negy, C., Shreve, T.L., Jensen, B.J., & Uddin, N. (2003). Ethnic Identity, Self-Esteem, and

- Ethnocentrism: A Study of Social Identity Versus Multicultural Theory of Development.  
*Cultural Diversity and Ethnic Minority Psychology, 4*, 333-344.
- Phinney, J.S. (1990). Ethnic Identity in Adolescents and Adults: Review of Research.  
*Psychological Bulletin, 108*, 499-514.
- Phinney, J. S. (1996). Understanding ethnic diversity. *American Behavioral Scientist, 40*, 143–152.
- Rakoczy, H., Wandt, R., Thomas, S., Nowak, J., & Kunzmann, U. (2018). Theory of mind and wisdom: The development of different forms of perspective-taking in late adulthood.  
*British Journal of Psychology, 109*, 6-24. doi:10.1111/bjop.12246
- Romero, A., & Roberts. R. E. (1998). Perception of discrimination and ethnocultural variables in a diverse group of adolescents. *Journal of Adolescence, 21*, 641-656.
- Roozen, B., & Shulman, H. C. (2014). Tuning in to the RTLTM: Tracking the evolution of language alongside the Rwandan genocide using social identity theory. *Journal of Language And Social Psychology, 33*, 165-182. doi:10.1177/0261927X13513765
- Sánchez, J. L., Martín, J., & López, C. (2017). Diagnostic utility of the shortened version of the Wisconsin Card Sorting Test in patients with sporadic late onset Alzheimer disease.  
*American Journal of Alzheimer's Disease And Other Dementias, 32*, 472-478.  
doi:10.1177/1533317517728334
- Shamay-Tsoory, S.G., Tomer, R., Goldsher, D., Berger, B.D., Aharon-Peretz, J. (2004). Impairment in Cognitive and Affective Empathy in Patients with Brain Lesions: Anatomical and Cognitive Correlates, *Journal of Clinical and Experimental Neuropsychology, 26*(8).

- Scheepers, D., & Derks, B. (2016). Revisiting social identity theory from a neuroscience perspective. *Current Opinion in Psychology, 11*, 74-78.
- Skowron, A., Fingerhut, R., & Hess, B. (2014). The role of assertiveness and cognitive flexibility in the development of postpartum depressive symptoms. *Journal of Reproductive and Infant Psychology, 32*, 388-399. doi:10.1080/02646838.2014.940518
- Spiro, R. J., & Jehng, J.-C. (1990). Cognitive flexibility and hypertext: Theory and technology for the nonlinear and multidimensional traversal of complex subject matter. In D. Nix and R. Spiro (Eds.), *Cognition, education, and multimedia: Exploring ideas in high technology* (pp. 163–205). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Staudinger, U. M. (1999). Older and wiser? Integrating results on the relationship between age and wisdom-related performance. *International Journal of Behavioral Development, 23*, 641–664.
- Staudinger, U. M., & Glueck, J. (2011). Psychological wisdom research: Commonalities and differences in a growing field. *Annual Review of Psychology, 62*, 215–241. doi:10.1146/annurev.psych.121208.131659
- Steffens, N.K., Gocłowska, M.A., Cruwys, T., & Galinsky, A.D. (2015). How Multiple Social Identities Are Related to Creativity. *Personality and Social Psychology, 42*, 188-203.
- Tajfel, H., & Turner, J. (1986). The social identity theory of intergroup behavior. In S. Worchel & W. Austin (Eds.), *Psychology of intergroup relations* (pp. 7–24). Chicago: Nelson-Hall.
- Tzeng, O., & Jackson, J. (1994). Effects of contact, conflict, and social identity on interethnic group hostilities. *International Journal of Intercultural Relations, 18*, 259–276.

U.S. Census (2017). *Quick facts: Orlando*. Retrieved March 30<sup>th</sup>, 2019 from:

<https://www.census.gov/quickfacts/orlandocityflorida>

Vésteinsdóttir, V., Reips, U., Joinson, A., & Thorsdottir, F. (2015). Psychometric properties of measurements obtained with the Marlowe–Crowne Social Desirability Scale in an Icelandic probability based Internet sample. *Computers in Human Behavior*, *49*, 608-614.  
doi:10.1016/j.chb.2015.03.044

Wilson, C. G., Nusbaum, A. T., Whitney, P., & Hinson, J. M. (2018). Age-differences in cognitive flexibility when overcoming a preexisting bias through feedback. *Journal of Clinical And Experimental Neuropsychology*, *40*, 586-594.  
doi:10.1080/13803395.2017.1398311