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Adult Anxious Attachment as a Mediator between Child Sexual Abuse and Dating Violence Victimization among Young Women

Jennifer M. Gómez

Abstract

Child sexual abuse is related to dating violence victimization for females. Because anxious attachment style is related to both child sexual abuse and dating violence victimization, it was hypothesized that anxious attachment would be a mediator between child sexual abuse and dating violence victimization for females. Two hundred fifteen female college students took an online survey. The results indicated that anxious attachment partially explains why child sexual abuse and dating violence victimization are related among young women. The results suggest that dating violence interventions for female survivors of child sexual abuse should address the fears and behaviors associated with adult anxious attachment.

Both child sexual abuse and dating violence victimization are prevalent and problematic among females (e.g., Silverman, Raj, Mucci, & Hathaway, 2001; Walker, Carey, Mohr, Stein, & Seidat, 2004). For young women, the likelihood for dating violence victimization increases following child sexual abuse, consequently, it is important to examine possible reasons for revictimization. Anxious attachment has been related to both child sexual abuse and dating violence victimization (e.g., Aspelmeier, Elliott, & Smith, 2007; Goldstein, Cheshire-Teran, & McFaul, 2008), therefore, the purpose of the study is to explore the relationships among these variables in a sample of young women.

The perpetrator-victim relationship is vital in identifying dating violence victimization; in a relationship in which the couple is not cohabitating, dating violence victimization is the experience of physical, sexual, and emotional/psychological abuse (Wolfe et al., 1996). Dating violence victimization and child sexual abuse affects many young people. Studies on dating violence vary in their findings on prevalence: namely between 25 and 37% of adolescent females report experiencing dating violence victimization (Gagné, Lavoie, & Hérbert, 2005; Silverman, Raj, Mucci, & Hathaway, 2001). Further, up to 60% of American college students have been involved in violent dating relationships, including 3% who have engaged in brutal forms of violence (O’Hearn & Margolin, 2000).

Dating violence victimization is also associated with scores of personal issues. For instance, mental health problems, such as low self-esteem, eating disorders, post-traumatic stress, anxiety, depression, and suicidal ideation are associated with dating violence victimization (Callahan, Tolman, & Saunders, 2003; Silverman, Raj, Mucci, & Hathaway, 2001). Additionally, dating violence victimization is linked to self-destructive behaviors (Banyard & Cross, 2008), such as alcohol abuse, substance abuse, and risky sexual practices, including lack of condom use (Ackard & Neumark-Sztainer, 2002; Raiford, Wingood, & Dielemante, 2007; Silverman, Raj, Mucci, & Hathaway, 2001). Not surprisingly, physical injury has been linked to dating violence victimization among females (Silverman, Raj, Mucci, & Hathaway, 2001). Dating violence victimization may also affect education, putting victims at an increased likelihood to have poor educational outcomes (Ackard & Neumark-Sztainer, 2002). For example, level of education is positively associated with salary for a variety of careers (Blanchard, 2006; Chapin, 2004). Therefore, lower level of education may affect the careers and socio-economic status of former victims of dating violence, making the correlates of victimization potentially detrimental to both social status and mental health. Similarly life-long, dating violence victimization increases the likelihood for further experience with intimate partner violence in future relationships. For example, Frieze (2000) found that dating violence was positively related to subsequent marital domestic violence.

Additionally, some of the aforementioned effects of dating violence victimization, such as depression and suicidal ideation, are particularly salient for females (Silverman, Raj, Mucci, & Hathaway, 2001). Further, while there is not consensus in the literature, some studies have found that females are more likely than males to experience dating violence victimization (Foshee et
al., 1996; Marquat, Namnini, Edwards, Stanley, & Wayman, 2007). Therefore, while dating violence victimization is harmful to all those who experience it, females may be particularly vulnerable to its immediate and chronic effects.

Interpersonal violence victimizations, aside from dating violence victimization, are prevalent and detrimental. Child sexual abuse includes molestation, both noncontact and contact, coercion, attempted rape, and rape that occurs before the age of 18. Relative to dating violence victimization, there is less consensus regarding child sexual abuse prevalence rates. According to regional and national studies, anywhere from 6-62% of female youth have been victims of child sexual abuse (Ulibarri, Ulloa, & Camacho, 2009; Walker, Carey, Mohr, Stein, & Seedat, 2004; van Roode, Dickson, Herbison, & Paul, 2009; Vogeltanz et al., 1999). Reasons for this wide range of prevalence may lie in the different ways that child sexual abuse is measured.

Although child sexual abuse is common for both boys and girls, there are gender differences in the prevalence of child sexual abuse. For instance, in a national survey of approximately 3,000 adults, Finkelhor and colleagues (1990) found that females were significantly more likely than males to be victims of child sexual abuse, and for females, that victimization was more likely to be perpetrated by someone known to the victim.

Research has found there are also gender differences in the effects of child sexual abuse. In a meta-analysis including 59 studies on college samples, trends were found indicating that females react more negatively to child sexual abuse as compared to their male counterparts (Rind, Tromovitch, & Baurman, 1998). A literature review supported these findings, indicating that female victims of child sexual abuse were more likely than male victims to develop pediatric post-traumatic stress disorder (Walker, Carey, Mohr, Stein, & Seedat, 2004). Lending support to the proposition that there are gender differences in child sexual abuse, a study by Alaggia (2005) found that while both genders tend to resist disclosure, female victims of child sexual abuse are more likely to blame themselves and to fear being blamed and/or not believed by others. Further, in concert with the vast problems associated with child sexual abuse—low self-esteem, guilt, self-blame, substance use, delinquency, sexualized behavior in childhood, and future sexual problems—females are more likely to exhibit internalizing psychological problems, such as anxiety, post traumatic stress, eating disorders, depression, and suicidal ideation (Bryant & Range, 1995; Doefler, Toscano, Jr., & Connor, 2009; Mullers & Dowling, 2008; Walker, Carey, Mohr, Stein, & Seedat, 2004; Weiner & Thompson, 1997; van Roode, Dickson, Herbison, & Paul, 2009) and externalizing symptoms, such as impulsive or hyperactive behavior (Doefler, Toscano, Jr., & Connor, 2009).

Most importantly, in regards to the current study, child sexual abuse has been positively associated with dating violence victimization, specifically for females. For instance, in a sample of 125 female adolescents, long lasting and severe child sexual abuse were the strongest predictors of experiencing dating violence (Cyr, McDuff, & Wright, 2006). In line with these findings, Hérbert and others (2008) reported that for adolescent girls, child sexual abuse was associated with dating violence victimization. They also found that an association between multiple victimizations (child sexual abuse and dating violence victimization) increased the risk for mental health disorders. This is why examining interpersonal violence victimizations in conjunction with one another is vital.

Understanding that female victims of child sexual abuse are at an increased risk for dating violence victimization is important. However, the association between child sexual abuse and dating violence victimization is more complex than simple revictimization. Therefore, it is important to investigate possible reasons why child sexual abuse puts females at an increased risk for dating violence victimization. Because attachment styles predict patterns of expectations, needs, emotions, and social behaviors within interpersonal relationships (Bowlby, 1982), adult anxious attachment, a schema that is characterized by high anxiety and preoccupation with relationships in general (Feeney, 1999; Milkuinserc & Shaver, 2007), may help explain the likelihood for interpersonal violence revictimization and thus the association between child sexual abuse and dating violence victimization among females. In conjunction with increased anxiety levels, Hazan & Shaver (1987) note that anxiously attached adults associate relationships with emotional extremes obsessive sexual attraction. Adult anxious attachment, which is more likely to manifest itself in females (Levendosky, Huth-Bocks, & Semel, 2002), is individually correlated with both child sexual abuse (Levendosky, Huth-Bocks, & Semel, 2002; Limke, Showers, & Zeigler-Hill, 2010; Shapiro & Levendosky, 1999), especially for females (Aspelmeier, Elliott, & Smith, 2007) and dating violence victimization (Goldstein, Chesir-
This is not surprising when we consider the characteristics of interpersonal violence victimization and adult anxious attachment. As previously mentioned, females are more likely to be sexually victimized in childhood by a known perpetrator (Finkelhor, Hotaling, Lewis, & Smith, 1990). The resulting betrayal inherent in this form of child sexual abuse may elicit increased anxiety in the form of fears, cognitions, and behavior for the victim. This anxiety does not necessarily end when the abuse end, therefore, this anxiety may be present in future interpersonal relationships, including romantic relationships. Said anxiety may evolve, taking the form of adult anxious attachment—e.g., high exclusivity, fear of abandonment, and intense need for the partner (Feeney, 1999; Goldstein, Chesir-Teran, & McFaul, 2008; Milkulincer & Shaver, 2007).

Research results that link anxious attachment with child sexual abuse and dating violence victimization (e.g., Goldstein, Chesir-Teran, & McFaul, 2008; Levendosky, Huth-Bocks, & Semel, 2002) may suggest that child sexual abuse may alter the way in which survivors cognitively perceive and relate to those around them. This alteration, which may result in a nervous preoccupation with romantic relationships [anxious attachment], may put female survivors of child sexual abuse at an increased risk for dating violence victimization.

Little research has examined the possible mediating role that adult anxious attachment may play in the association between child sexual abuse and dating violence victimization. This mediation model is important to examine because dating violence victimization can have severe and chronic effects (e.g., Ackard & Neumark-Sztainer, 2002; Banyard & Cross, 2008; Frieze, 2000; Silverman, Raj, Mucci, & Hathaway, 2001).

This research may suggest that abuse that occurs early in life may have a lasting impact on the types of relationships that are engaged in throughout early adulthood, particularly for females. Therefore, the objective of the current study is two fold: to examine the relationships among adult anxious attachment, child sexual abuse, and dating violence victimization among young women; to investigate adult anxious attachment as a mediator between child sexual abuse and dating violence victimization among young women.

**Method**

**Participants**

The current study utilized a data set from 2008 that included 365 college students who were recruited from the psychology department at a Southwestern university. For the current study, participants had to be female in order to be included in the analyses (N = 215). The sample was multicultural (40% White, almost 25% Mexican, Mexican-American, and other Latino, 5% Other, almost 5% African American, and 4% Asian/Pacific Islander; approximately 20% declined to answer), who ranged in age from 18-33 (M = 19.54, SD = 2.07).

**Procedure**

Enrollment in an Introductory Psychology course was the only criterion to participate in the study. However, data analyses were run only on responses of participants who had dated at least once in the past year and were unmarried. At the time and location of their own discretion, participants signed into an online system. To receive extra credit for a psychology class, participants accessed the Dating Behaviors Survey, which included instructions that participation was voluntary—with an option to remove oneself from the study at any time without penalty—anonymous, and confidential. Participants completed the 30-minute survey in one sitting, followed by a debriefing form.

**Measures**

Three measures were used to assess dating violence victimization, child sexual abuse, and adult anxious attachment among young women: the Conflict in Adolescent Dating Relationship Inventory (Wolfe, Scott, Reitzel-Jaffe, Wekerle, Grasley, & Pittman, 2001), the Sexual Experiences Survey (Koss & Oros, 1982; Ulloa, Baerresen, & Hokoda, 2009), and the Adult Attachment Scale (Collins & Read, 1990). Items were included and/or analyzed based on their applicability to the study.

The Conflict in Adolescent Dating Relationship Inventory [CADRI] (Wolfe, Scott, Reitzel-Jaffe, Wekerle, Grasley, & Pittman, 2001), a 35-item questionnaire that was designed for adolescents ages of 13 to 19, assesses dating abuse within the previous year. For the current study, only the dating violence victimization items were analyzed. A sample item is as follows: My dating partner kicked, hit, or punched me. Responses were marked on a Likert scale, with 1 being ‘never’ and 4 being ‘often.’

There are several reasons the CADRI (Wolfe et al., 2001), which was designed for adolescents, was used in this study on young adult women. Though our sample was comprised of
young adults, it was anticipated that the participants’ average age would not exceed 19. Further, the CADRI measures relatively milder forms of relationship violence than some other relationship violence measures (e.g., the Conflict Tactics Scale [Straus, 1979]); in a relatively low-risk university sample that is predominantly middle-class, mild to moderate forms of dating violence may be more common than severe forms. Therefore, utilizing a measure such as the CADRI would be beneficial for this sample.

The Sexual Experiences Survey [SES] (Koss & Oros, 1982), a 17-item questionnaire, assesses sexual aggression and victimization. It was designed for young adults ages 18-24. Participants who endorsed an event on the SES were then asked to indicate the age at which that event first took place. For the current study, only SES incidents that occurred before the age of 18 were identified as child sexual abuse and subsequently analyzed. The scores gathered from the SES were interpreted categorically (Ulloa, Baerresen, & Hokoda, 2009); each respondent was assigned to the category representing the most severe level of sexual abuse she had experienced, as follows: no abuse (scored as ‘0’), noncontact molestation, contact molestation, coercion, attempted rape, and rape (scored as ‘5’). A sample item is as follows: *Has someone ever had sex with you when you didn’t want to because he used force? If yes, how old were you when this FIRST happened to you?*

Adult Attachment Scale (Collins & Read, 1990) is an 18-item questionnaire that assesses attachment styles within the context of dating relationships. For this study, the scale was modified to include only the six anxious attachment items. A sample item is as follows: *In relationships, I often worry that others will not stay with me.* Participants reported their responses on a Likert scale of ‘1’ being ‘strongly disagree’ and ‘4’ being ‘strongly agree.’

**Results**

The objective of the study was twofold: to examine the relationship among adult anxious attachment, child sexual abuse, and dating violence victimization among young women; to investigate adult anxious attachment as a mediator between child sexual abuse and dating violence victimization among young women.

To investigate this, a mediation analysis was run with regressions in accordance with Baron and Kenny’s (1986) structure for testing mediation. See *Figure 1*. A Sobel’s Test was then run to confirm the proposed indirect effect of anxious attachment on the association between child sexual abuse and dating violence victimization.

Before conducting a Sobel’s Test, four regressions were run to test for a mediation. Child sexual abuse was regressed onto dating violence victimization ($\beta = .24, p < .001$), child sexual abuse was then regressed onto the potential mediator, adult anxious attachment ($\beta = .16, p < .05$), and adult anxious attachment was regressed onto dating violence victimization ($\beta = .20, p < .05$). Finally, adult anxious attachment was controlled for in the regression of child sexual abuse onto dating violence victimization; because the association between child sexual abuse and dating violence victimization was reduced when adult anxious attachment was included in the model ($\beta = .21, p < .05$ from $\beta = .24, p < .001$), a partial mediation was inferred.

To confirm the proposed indirect effect, a Sobel’s Test was run ($z = 1.72, p = .09$). Contrary to the inferences made by the regression analyses, the Sobel’s Test failed to confirm that adult anxious attachment is a partial mediator between child sexual abuse and dating violence victimization among young women.

**Discussion**

This study examined the relationships between child sexual abuse, dating violence victimization, and adult anxious attachment in young women. It was hypothesized that all three variables would be related, and that adult anxious attachment would partially explain the association between child sexual abuse and dating violence victimization. Preliminary regression analyses lent support to these hypotheses. Child sexual abuse was related to dating violence victimization, child sexual abuse was related to adult anxious attachment, and adult anxious attachment, when
controlling for child sexual abuse, was related to dating violence victimization. When testing for a mediation, the relationship between child sexual abuse and dating violence victimization was reduced when controlling for adult anxious attachment, lending support to the hypothesis that adult anxious attachment is a partial mediator. A Sobel’s test was run to confirm the proposed indirect effect of adult anxious attachment on the association between child sexual abuse and dating violence victimization for young women. The test did not support the hypothesis, yet the trend was in the right direction ($p = .09$). Although the mediation hypothesis was not fully supported, the results contribute to the literature by documenting the associations among child sexual abuse, dating violence victimization, and adult anxious attachment among females, as well as determining a mediator that partially explains the link between child sexual abuse and dating violence victimization.

The association between child sexual abuse and dating violence victimization is well-documented in the literature. Because more girls than boys are victims of child sexual abuse (Finkelhor, Hotaling, Lewis, & Smith, 1990; Rind, Tromovitch, & Bauserman, 1998) and because research has suggested girls are affected more severely from child sexual abuse (Walker, Carey, Mohr, Stein, & Seedat, 2004), the mechanisms that contribute to females’ increased vulnerability to revictimization needs to be examined.

Investigating a cognitive schema as a potential mediator between child sexual abuse and dating violence victimization for females is beneficial for eventually weakening the strength of this association. Hazan and Shaver (1987) characterize anxious attachment with high intensity, emotional highs and lows, and intense and obsessive sexual attraction. The authors of the current study propose two possible theoretical orientations to explain why female victims of child sexual abuse and female victims of dating violence are more likely to be anxiously attached; the first could be that the high priority and/or expectation of the aforementioned relationship characteristics (e.g., emotional highs and lows) could overshadow the desire for and knowledge of healthy relationship characteristics (e.g., positive conflict resolution). Secondly, these adult anxious attachment relationship characteristics may in and of themselves be associated with abusive behaviors; consequently, the need for one (e.g., obsessive sexual attraction) may facilitate the tolerance or expectation of another (e.g., rape). Further research should be conducted to test these theories.

The current study’s mixed findings foment speculation. Perhaps the approach to the study was too narrow in scope, with the effects of child sexual abuse being so vast and disparate (e.g., childhood sexualizing behavior and future sexual problems [Mullers & Dowling, 2008; Walker, Carey, Mohr, Stein, & Seedat, 2004]), investigating only one mediator to even partially explain this complex association between child sexual abuse and dating violence victimization may not be sufficient. Additionally, this data collection only utilized a portion of the Adult Attachment Scale (Collins & Read, 1990), for a total of six items. This abbreviated scale may not have detected the adult-anxious-attachment construct accurately. Future studies should employ multiple complete scales of each construct in order to capture all dimensions of the constructs. Further, the strategy of using multiple scales will also help to validate responses, as self-report is a common method of data collection in trauma research. Finally, a higher-risk community sample may better capture the dynamics amongst child sexual abuse, dating violence victimization, and adult anxious attachment, as well as be more generalizable to the young-women population.

Despite the current study’s limitations, several implications can be garnered from the results of these preliminary regression analyses. For instance, our results bolster Hérbert and colleagues’ (2008) supposition that some interventions should address multiple victimizations, such as child sexual abuse and dating violence, because they are related to more mental health problems than one type of interpersonal violence victimization. Specifically, the current study’s results suggest that some dating violence interventions should be designated for at-risk females (history of child sexual abuse), with a focus on reducing adult anxious attachment style in order to protect against dating violence victimization. Finally, some dating violence primary prevention programs should be gender specific, with an emphasis on child sexual abuse as a predictor of revictimization.

References


Searching for Community

Román Liera

Abstract

Transfer students must navigate two distinct institutions, thus it is crucial to explore the experiences of these students. Research has suggested that socialization and positive interactions with faculty, staff, and college students increase the importance of students creating effective road maps to access resources (Attinasi, 1989; Bensimon & Dowd, 2009). Three semi-structured interviews were conducted to explore the transfer experiences of Mexican-American students. Two common themes arose from the interviews: the perception of competition and the need to find community. Future studies should address the difference between perceived competition at a four-year institution and the actual level of competition and also explore the process of forming community at both community colleges and four-year institutions.

Numerous researchers have stated that Latina/o students indicate having high aspirations of transferring to four-year universities and attaining a bachelor’s degree; however, many students do not fulfill their goals of transferring (Ornelas & Solorzano, 2004). Only 7.9% of bachelor degrees awarded by degree granting institutions, in 2007-2008, were held by Latina/os compared to 71.8% of whites (National Center for Education Statistics, 2011, Table 285). Furthermore, Latina/o students of Mexican descent are more likely to attend two-year colleges than other subgroups from the Latino population (Excelencia, 2011).

Transfer rates from two-year colleges to four-year colleges have been shaped by students’: college readiness (Ornelas & Solorzano, 2004); lack of knowledge about financial help, unwillingness to leave community and family, lack of family involvement (Suarez, 2003) and being “cooled out” (Conway, 2010, p. 210). Although it is important to consider external influences such as social economic status, family support, type of K-12 school (public or private), location of school (urban, rural, or suburbs), and peers, researchers have suggested a need to explore how personal experiences (school or familial experiences) motivate students to persist with their education (Suarez, 2003).

Latina/os of Mexican descent make up more than 60% of the Latino population in the United States (U.S. Census, 2011; Pew Hispanic Center, 2008) and 25% in California (U.S. Census: American Fact Finder, 2000). The current degree attainment of Mexican-American students is not sufficient to contribute to the well-being of the economy (Bensimon & Dowd, 2009). Attinasi (1989) suggested that socialization with faculty, school personnel, and peers shape students’ strategies to locate resources while Bensimon and Dowd (2009) also found that interactions with professors, staff, and college students increase the likelihood of creating effective road maps to access resources. It is imperative that researchers further investigate the transfer process of Mexican-American students to understand how Mexican-American students perceive the effectiveness of the resources offered to them on campus.

Purpose and Rationale

The purpose of the study is to explore the experiences of Mexican-American community college students who transferred to a university. Specifically, this study seeks to gain understanding into the ways in which students’ personal experiences played during the transfer process from community college to a university. We explore these experiences through the lens of a psychological construct called Need for Cognition (Cacioppo, Petty, & Morris, 1984) to understand how students engage in thinking during the process of transfer. Need for cognition is defined as people’s tendency to engage in and enjoy thinking (Ruiter, Verplanken, De Cremer & Kok, 2004). Mexican-American undergraduate students indicate having high aspirations to attain a bachelor’s degree, yet compared to other ethnic groups they have lower transfer rates and require more years to transfer to four-year universities (Hagedorn & Lester, 2006). Moreover, the disproportionate number of Mexican-American students who have bachelor degrees caused the researchers to wonder about why some Mexican-American students attain a bachelor’s degree and others do not.
One possibility is how individuals process and learn information, which has been a process educational researchers have explored in the academic context (e.g., Coutinho, Wiermer-Hastings, Skowrons, & Anne-Britt, 2005; Evans, Kiry, & Fabrigar, 2003; Padgett, Goodman, Johnson, Saichaie, Umbach, & Pascarella, 2010), yet research on how educational experiences shape need for cognition is sparse. Socialization with faculty, staff, educators, peers and family have been documented to influence student outcomes in navigating postsecondary education (Bensimon & Dowd, 2009). If attaining a bachelor degree requires effective navigation through postsecondary education, then why are some Latina/os more successful than others? How do interactions at community college shape transfer students’ motivation and persistence to attain a bachelor degree? Furthermore, how do those same interactions influence the development of strategies to access academic resources?

Therefore, we are specifically exploring how Mexican-American undergraduate students perceive both the community college and four-year university campuses and attainable resources to help them with their academic development. By exploring the ways in which Mexican-American students extract and think about their experiences as they progress towards their academic goals, this study seeks to identify their development of cognitive maps (Attinasi, 1989) that support student transfer in postsecondary education. Three main research questions guide this study:

1) What are Mexican-American students lived experiences in navigating the transfer process from community college to university?
2) What factors may have contributed to the formation of cognitive maps during the transfer process?
3) What role do cognitive maps play in the transfer process?

**Literature Review**

Bensimon and Dowd (2009) explored the transfer choice gap for Latina/o students. Transfer choice gap refers to the phenomenon of transfer students who are eligible to transfer to a selective university but choose to transfer to a less selective university (Bensimon & Dowd, 2009). They focused on Latina/o transfer students because high achieving Latina/o students are more likely to attend less selective colleges than more selective universities. Latina/o students’ who effectively socialized with faculty, peers, and family members were more confident and more effective in transferring to selective universities than those who possess less social capital. The absence of transfer agents, individuals with institutional authority who help students’ navigate the campus and develop a sense of belonging, inhibit students’ from becoming competent navigators of postsecondary institutions (Bensimon & Dowd, 2009).

The lack of social interactions with transfer agents limited students from attaining the proper information regarding qualifications to transfer to more selective universities (Bensimon & Dowd, 2009). Regardless of their academic potential these students were not aware of how to prepare to transfer to more selective universities, hence their marginalized options of potential transfer schools. Interactions with experienced college goers are essential in assisting Latina/o students to anticipate what to expect and what to do to get to their desired destination. It is interesting how some Latina/o students were able to network successfully with transfer agents and peers while others were not. If cultural differences within Latina/os influence how they interact with others, then this dimension of their identity should be considered.

Bensimon and Dowd (2009) focused on the overall Latino population. The Latina/o label is considered a panethnicity because the population consists of diverse groups with different cultural experiences. Lee (1994) pointed out the intragroup differences between Asian-Americans who identify themselves as Koreans or Asian-Americans regarding future opportunities and academic achievement. Similar to Asian-Americans and Koreans, Mexican-Americans also belong to a panethnicity. Groups who belong to the Hispanic1 panethnicity are diverse and identify themselves with different labels. Lee (1994) stated that Koreans identify and socialize with Caucasians in order to become ‘Americanized.’ If this differentiation occurs among the Asian-American panethnicity then it would be interesting to explore how this might be experienced among the Mexican-American students.

Attinasi (1989) focused on the college going behaviors of first year Mexican-American college students. After analyzing the interviews, he conceptualized two schemes to explain participants’ college going behaviors and attitudes. Getting ready refers to attitudes and behaviors before matriculating to the university whereas getting in refers to attitudes and behaviors after matriculating to the university (Attinasi, 1989, p. 255). Five categories were developed to constitute the experiences of getting ready attitudes: initial expectation engendering, fraternal modeling, mentor modeling, indirect simulation, and direct
simulation (Attinasi, 1989, p. 256). Each of these getting ready behaviors resulted in either expectations to attend college or expectations of how college-going behaviors would like for participants.

Getting in attitudes were categorized into two behaviors: getting to know and scaling down (Attinasi, 1989, p. 263). Getting to know behaviors include two subcategories: mentoring and peer knowledge sharing, where participants interacted with higher class level students or other freshmen students, respectively. Scaling down refers to students ability to narrow down the geography of the campus into more manageable units. These two concepts helped participants decide what to major in and made their transition to getting in smoother (Attinasi, 1989).

Attinasi’s results lead him to conclude that students’ interactions with mentors and peers are imperative for their persistence in college because they help them develop specific strategies to navigate the “physical, social, and cognitive/academic geographies of the campus” (Attinasi, 1989). The concept of the cognitive map refers to the development of conceptions regarding objects on campus (Attinasi, 1989, p. 268). Cognitive maps help students locate themselves in their perceived geography of the campus by learning how to identify objects in the environment and assign meaning to the objects. In other words, a cognitive map helps students navigate the campus and understand where to locate resources and how to manage the responsibilities of being a college student.

Attinasi (1989) suggested that students integrated into the campus environment for more cognitive than moral reasons. In other words, their motivation to socialize with educators and peers was not to be formal, but it was to make their transition to a four-year university more convenient and have a more successful experience. Padgett et al., (2010) also looked at the importance of socialization with peers, faculty, parents and non-college reference groups (e.g., employers and community organizations) on cognitive and academic development. They found that socialization experiences with faculty and peers positively affected need for cognition; however, first-generation students who experienced this same socialization experienced the opposite effect on need for cognition (Padgett et al., 2010).

First-generation students may not have the experience to socialize with faculty and peers because of the lack of college going experience. If socialization influences the development of cognitive maps and these cognitive strategies shape how students will navigate through campus, then what role does need for cognition play in this process? Students who socialize with faculty and peers have greater need for cognition than students who do not socialize with faculty and peers. Can it be that educational experiences shape need for cognition which influences how well students’ construct cognitive maps?

Need for cognition is defined as people’s tendency to engage in and enjoy thinking (Ruiter et al., 2004). Need for cognition may also represent a motivational tendency that can be developed through experiences with complex endeavors to fulfill intrinsic rewards that individuals may attain from these types of efforts (Cacioppo, Petty & Morris, 1983). Researchers found that people with high need for cognition tended to extract more from and think more about information previously presented than those with low need for cognition (Cacioppo et al., 1983). The type of socialization students receive before transferring to a four-year university may shape how their need for cognition will develop and how they process information. Meaningful interactions may trigger students’ to engage more in thinking than less meaningful interactions. The quality of interactions can influence higher levels of information processing, (Cacioppo et al., 1983) hence those experiences may result in more effective cognitive maps about the university.

Methods and Research Design

A qualitative paradigm was sought to generate meaning from the transfer experiences of Mexican-American undergraduate students. Qualitative methods allowed the researchers to interact with the participants and collect data. A phenomenological approach was appropriate to explore the experiences of Mexican-American undergraduates who transferred to a four-year university. This approach enabled the researchers to set aside their own experiences in order to understand the phenomenon of transferring to a four-year institution (Creswell, 2009). It also allowed the researchers to understand participants’ common and shared experiences in order to gain a deeper understanding of the transfer phenomenon (Moustakas, 1994). After analyzing the interviews, categories were developed to describe the participants’ experiences during the transfer process (Creswell, 2009).

Three semi-structured interviews were employed to create dialogue between participants and researchers. The interviews permeated the researchers to gain access to the experiences of Mexican-American undergraduate students and their development of cognitive maps through the
process of transferring to a four-year university. The interviews also allowed participants to share historical information with the researchers.

Participant Population
There were a total of three participants, 2 women and 1 man. Participants were recruited through the Educational Opportunity Program (EOP), since the office is home to the Transfer Bridge Program. This study focused on understanding the experiences of Mexican-American students who have transferred from a community college to a four-year university, hence, participants had to meet the following criteria: 1) currently be enrolled as a sophomore, junior, or senior; 2) have transferred to the university from a community college and; 3) self-identify as Mexican-American.

Procedure
Flyers were posted in the EOP office and were also provided to staff members in hardcopy and electronic form to distribute the flyers to students who met the selection criteria (see participant population). Participation was strictly voluntary and the choice of whether to participate did not influence their future relations with San Diego State University or San Diego State University Foundation. Participants were free to withdraw their consent and stop participation at any time without penalty or loss of benefits to which they are allowed.

Students who were interested in participating were instructed through the flyer to email the Principal Investigator (PI) or Co-Investigator (Co-PI) if they were interested in receiving more information about the study. The PI or Co-PI contacted interested students via email to share the purpose of the study and the criteria for participation (see participants populations). Students were asked if they believe they met the criteria. If the student met the criteria she or he was asked to reply to the email to confirm their interest in participating in the study to arrange for a one-hour long interview. Once the student replied to the email, the PI or Co-PI arranged an interview. Data were not collected during the participant screening process. Data were only collected from students who agreed to participate in the study.

During the one hour interview participants were asked questions regarding their educational experiences as Mexican-American transfer students. For example, “what influenced their decision to attend postsecondary education,” “how did they feel when they arrived to West Coast University,” and “how confident did they feel when they first arrived to West Coast University?” After the one hour interview participants were asked to complete a questionnaire containing demographic questions such as class level, number of years at WCU, whether they considered themselves to be a member of the Latina/o population, and GPA, and an 18-item need for cognition scale (Cacioppo et al., 1984) which approximately took 5 to 10 minutes to complete. Consistent with Haugtvedt and Petty (1992) the need for cognition 18-item scale was distributed at the end of the session in order to reduce the possibility of priming the responses for the questions regarding their experiences. Need for cognition questions on the survey were used only for descriptive statistics.

The Researcher’s Role
In qualitative research, the role of the researcher entails him/her to be the primary data collection instrument (Creswell, 2009). This means that the researcher must be aware of and identify their own personal values, biases and interests at the outset of the study (Creswell, 2009). However, the researcher’s experiences can help shed light into the phenomenon rather than detriment the study. My interest in the transfer experiences of Mexican-American students resides from my own experiences as a first-generation, underrepresented, and low-income Mexican-American transfer student. I was unprepared to meet the demands of postsecondary education after I graduated from high school. It took three years for me to transfer from a community college to a four-year university. The ability to think about and understand how my experiences shaped how I navigate the transfer process helped me be persistent to attain a bachelor degree.

My membership to the population of interest allowed me to sympathize and understand the experiences of the participants. My knowledge of the transfer process also enhanced my awareness of the transfer phenomenon. Furthermore, every effort was made to ensure objectivity, yet my biases may shape how I viewed and understood the data and how I interpreted my experiences.

Findings
Each participant described a unique path to transfer from the community college to the university. Although differences were apparent there were also shared educational experiences between the participants. The findings could have been richer with a larger sample of participants, but the information obtained from these three participants is valuable in improving the transfer experiences of students. These unique transfer experiences, regardless of the support that each had before transferring to a four-year university,
illuminating the difficulties transfer students have navigating four-year institutions.

Xitochie, who has been at WCU for seven years, was involved in social movements during the mid 1990’s. Prior to attending WCU, Xitochie attended community college for 8 years because she went from being a full time student to being a part time student with a full time job. Xitochie is a local student who has been involved in social activist groups since high school. She was admitted to WCU after high school, but financial circumstances inhibited her from enrolling. Her participation protesting proposition 209 allowed her to network with people who attended community colleges and four-year universities. The interactions with college students provided her with expectations of how a four-year institution will be like. For example, Xitochie stated, “I knew that the universities aren’t that diverse that when you got into a university that the majority of the population in the university is white students and I knew that I was gonna have to look for where I was going to have access to students of my color.”

Another participant by the name of Michelle is currently in her third year at WCU. She attended two different community colleges before matriculating to a four-year university. Her community college experiences shaped how she navigated the four-year institution. She stated that “at community college I actually thought the lab and the internship were actually a part of a masters schooling not really the bachelors.” Although Michelle attended two different community colleges, she was not aware of such opportunities like internships or research experiences working with faculty. When she arrived to WCU, she felt “excited to pursue a degree because at community college [she] was very confused and did not know what [she] wanted to do.” When Michelle transferred she stated feeling “relieved to finally know” what she wanted to do. The lack of knowledge regarding the opportunities at WCU was from insufficient information from both the community college and the four-year institution. For example, upon arriving to WCU she realized that students were actively involved in internships or research labs. As a result she stated that “[she] needs to start thinking about internships, job experiences, volunteer experiences and all the other things that go around your classes. Michelle explained how “it is not just about the grades it is much more than that.” It seems that Michelle felt unprepared when she arrived to WCU.

The third participant, Rico, is in his second year at WCU. He mentioned that in high school he “was not doing very well and was kind of fucking up and hanging out with the wrong crowd.” However, his mother informed him about middle college a program that introduces students to college courses and helps them complete high school requirements. “Middle college paid for my community college classes and my books.” Rico said that once he completed the “high school equivalent classes” he began to take general education classes. His transition to community college was feasible because he was already taking high school courses at the community college. After taking college courses he became re-interested in learning and wanted to learn more, so he was advise to transfer to a four-year university. Rico did not have any preconceived expectations of how a four-year university would be like; instead he was driven by his excitement to learn.

Rico had to withdraw from WCU for a year and a half because of personal reasons. Once he returned to WCU he still felt that there was minimal support from counselors and faculty. He is currently having a difficult time locating extensive support at WCU. When Rico was asked whether he has looked for other sources of community he stood quiet and said in a soft voice “basketball.”

Community College Experiences

“I knew for sure that the school I was at Big College was a rarity. I knew that other campuses would not be like that and I also knew universities were not like that.” Xitochie’s experiences at community college provided her with the opportunity to interact with diverse ethnic groups and with people of different ages. Some of the people who she protested with also attended Big College; as a result, she had a welcoming experience when she arrived to community college. Her vision of how a four-year institution was shaped by her interactions with students at Big College. She explained the shared knowledge in detail:

You are going to be surrounded by whiteness and there is going to be a different mode of thinking. It is very individualistic and if you are not one of those people who do not work by yourself and you do not need a community then you are okay, but if you are one of those people who does not work by yourself and you need a community and you need the support then you need to find [some]where you can create community. You can find that outlet where you do not need to
feel so alone or feel so alienated
and where you can speak to
somebody who has the same type
of either background or
experiences.

Xitochie internalized her knowledge to
navigate a four-year institution from her
interactions and experiences at Big College. The
thought of being alienated persuaded her to become
persistent and search for a community once she
arrived to state. Her motivation to look for
resources to transfer helped her navigate
postsecondary education. Although she was
persistent locating information she believed that she
was not properly “send off” to WCU.

Michelle’s community college experiences
were composed from attending two campuses: Distance College and Piedra College. She provided
detail examples of her experiences at both
campuses. She started off by stating that she was
confused when she was in community college
because she would constantly change her mind
about what career to choose. She attended Distance
College for one and a half years, although Piedra
College was five minutes away from her house,
because she perceived it to be a better campus than
Piedra College.

Michelle explained that Distance College
provided her with a more interactive learning
environment than Piedra College. For example,
students at Distance College were more motivated
and teachers approach students instead of students
seeking out teachers. She mentioned that teachers at
Distance seemed to care more about students while
teachers at Piedra seemed to not care as much.
Michelle concluded teachers at Piedra College did
not care about students when she asked one of her
teachers if she can reschedule an exam. Michelle
was too not comfortable when she explained the
event where her teacher gave her an ‘A’ because he
stated that “I know you know the information.” She
said that she was surprised because “that is
something no one would ever do at Distance.”
Michelle believes that it was unethical that the
teacher just gave her an ‘A’ instead of rescheduling
the exam. This event exemplifies the lack of teacher
involvement in the learning outcomes of students.
If teachers do not challenge their students then how
can educators expect transfer students to meet the
challenges at four-year institutions?

Michelle mentioned that teachers and
students at community college “instill fear” in her
about the level of difficulty at a four-year
university. For instance, teachers made comments
about the work students turned in, “this is totally
not acceptable I don’t know if you’ll make it to
college like that.” She also witnessed fellow
classmates giving up, hence her level of
nervousness about transferring to a four-year
institution increased. As a result of these
experiences she developed a sense of “instill fear”
of how state will be like. This sense of “instill fear”
influence Michelle to sit in the front row of her
classes, take all of her books to school and ask her
friends about the degree of difficulty in a four-year
campus.

The difference between Rico and the first
two participants is that he transferred from a school
outside of San Diego. In other words Rico is not a
native of San Diego. As mentioned earlier, Rico
was not interested in school and school was not a
big topic in his house. Rico stated that community
college was a “place to do my creativity” through
the introductory courses he took. The support he
received from the transfer counselors and Transfer
Excel Program (TEP)\(^4\), which he joined after he
completed the middle college program, provided
him with guidance, and extensive counseling. TEP
is a support program intended to help
underrepresented students transfer to a four-year
university. TEP motivated him to excel in
academia. Francisco, a transfer counselor who Rico
met through TEP, became his mentor and inspired
him to continue with his education. The option to
contact someone to help him navigate
postsecondary education was paramount for his
persistance to attain more knowledge.

It took him a while to decide to transfer
and attain a bachelor degree because he started
taking classes that were interested to him rather
than having a transfer plan. Rico explains how he
decided to transfer from a community college to a
four-year university:

> It was just like the next step you know I
mean it was here it is community college
alright I wanna keep learning. I could have
just kept taking community college classes
and be like this is cool you know GE’s you
need to take anthropology. I took a little
bit of everything this is tight. I want more I
just wanted more you know everyone was
transfer to a university so that’s where I set
all my goals and put all my intentions.

Along with the motivation to want more
Francisco’s support help him successfully navigate
postsecondary education. For example, he indicated
that TEP took students to potential transfer schools
and provided them with “scholarships, book grants,
scantrons and pencils.” The support he had at
community college was imperative for his success
in transferring to a four-year university.
The community college experiences of these participants shaped their perception of how a four-year university will be like. Each one of them had some type of support system whether it was friends, mentors or the class environment that made them feel excited to transfer. However, when they arrived to WCU some of their expectations were not met while other expectations were accurately anticipated.

**Experiences at West Coast University**

Cultural shock was Xitochie’s description of how she felt when she arrived to WCU. Her anticipation that WCU will lack racial and ethnic diversity influenced her class schedule. She stated I purposely picked one English class and the other class was an ethnic studies class because I felt that was going to be my only access to students of other color and where I wouldn’t be the only Mexican in class or only minority in class.

She had a difficult time explaining why she felt she needed to prepare for cultural shock, but it became obvious that her interactions with other students and involvement in social movements shaped how she viewed four-year institutions.

Xitochie mention the importance of forming community in order to inhibit oneself from losing themselves. Some of her friends drop out of school because they were unable to locate a home where they felt welcomed and supported to stay motivated. Just like she did not receive a proper “send off” from community college she also did not get a proper “receiving” at WCU. The information provided to her in orientation was broad. Information regarding research opportunities, internship opportunities and class scheduling was not provided during orientation. She recalled that the only type of information she received was about travel abroad programs.

Her friend Barbara, who was attending WCU, showed her the physical aspect of campus. Barbara showed her the parking structures and the buildings on campus. Xitochie was grateful for Barbara’s help, but Xitochie felt that she needed more information about academic opportunities, scholarships and how to network with professors. She met her mentor through her Chicano/a class and was provided with resources regarding research and scholarship opportunities. According to Xitochie, she was not informed about the process of completing scholarships until her mentor provided her with the proper guidance. Her interactions with her mentor made her feel that she found a home in the Chicano/a department.

One interesting comment Xitochie mentioned was:

I think WCU is really good about giving you general information but it is nice little secrets I guess or I don’t know what to call them. I think that there are definitely gate keepers. Certain people only get access to certain information and if you get lucky then you are going to get access to that information.

Her perception of WCU was that only certain individuals get specific information. Awareness of this type of information influenced how she navigated campus and also made her persistent to locate the proper resources.

Michelle had a sense of instill fear because she was told that a four-year university was going to be difficult compared to a community college. Out of the fear of unpreparedness and failure she brought a rolling backpack filled with all of her books to WCU. During her first semester the level of competition became apparent. Michelle stated that “you already starting your first semester your first year and they (students) are already thinking about after graduating they are already thinking about building up a resume for when they graduate.” The realization that other students were involved made her feel that she was behind.

Michelle noted that a level of competition at WCU was higher than at community college. This sense of competition helped her understand that there are a lot of smart people who have the same goals and have to compete for the same job.” For instance, students compete with each other for the “better grades, who graduated from the better school with the better grade point average.” After this event she started to look for internship opportunities. Her quest to become a successful and competitive student rose from the realization of needing an overall resume by the time she graduates. Her career plans were shaped by the internships she participated in and how she navigated campus.

Rico was excited that he made it because school was not a big thing in his house, but when the semester started he was intimidated with the size of campus and student body.

It was intimidating and like I tried to see some counselors and was a little disappointed just because they did not have a lot of time you know. I understand because it is like they have so many more students to deal with but yeah it was a little... it was a little disappointing because I came from having all this support all this connections all this community and then I came here and it was like oh you are like a number.
transfer students the sense of belonging can help the instructions to navigate campus and analyze their perception
of competition. It is interesting how each participant had different pathways transferring to the same campus, but had similar experiences.

Cognitive Maps

It was stated earlier that the quality of interactions may influence how students develop cognitive maps to navigate campus. The participants for this study shared their interactions from community college. It was clear that their interactions while enrolled in community college shaped their perceptions of what to expect once they transferred to the university. Being aware that belonging to a community was essential for their success these transfer students sought for community to help them navigate the physical, social and cognitive/academic geographies of the campus.

The culture of the campus (size, ethnic background, resources) overwhelmed Xitochie, Michelle and Rico when they arrived to WCU. Xitochie’s cognitive map included strategies to search for opportunities through involvement in ethnic classes and interactions with mentors who belong to the same ethnic group. Michelle’s strategies were to look for internship opportunities and interact with motivated students. Rico is looking for the support that he had at community college. He is still searching for a mentor like Francisco to inspire him to continue with his education.

Need for Cognition

The need for cognition scale was only utilized for demographic purposes. The researchers are aware that statistical analyses are practically useless with only three participants. It was interesting to see what the participants would answer on the need for cognition scale. For the most part the responses were similar, however, for some of the questions Rico disagreed while Xitochie and Michelle agreed (e.g., The idea of relying on thought to make my way to the top appeals to me and I prefer my life to be filled with puzzles that I must solve). Again, it is not possible to make any connections between the interviews and the scale. It would be interesting to follow up with the participants and increase the sample in order to analyze the need for cognition scale.

Implications

The findings from these interviews suggest that some Mexican-American transfer students are still having a difficult time adjusting to a four-year university. Colleges and universities can adopt strategies to break the university into more manageable compartments. The common theme of
looking for community can be a starting point for colleges and universities to consider. For example, during orientation the university can engage with smaller groups of students instead of providing the information in large lecture halls. The university can also promote opportunities for students who do not belong to the dominant culture of the campus.

The sense of belonging was an important theme for these Mexican-American transfer students. Participants were asked if they can go back what would be some of the things that they would do the more prominent responses were: get involved, find more resources, and take advantage of the services on campus. With the current budget cuts it would be difficult for both colleges and universities to provide more resources for students, but colleges and universities need to prioritize from where they cut money.

Community colleges and four-year universities should continue to improve the transfer bridge so transfer students do not become too overwhelmed. Counselors, previous transfer students (of different ages, ethnicities and gender identity), faculty, and ethnic clubs should be involved to welcome new transfer students. Events that familiarize transfer students to the physical, social, and academic aspects of the campus will help transfer students develop strategies to become successful students. Community colleges should introduce students to the different opportunities available at four-year universities. An “opportunities fair” can be utilized to share the opportunities available at four-year universities. Current college students should also be scheduled to share their experiences at a four-year university. Prior to enrolling at the university transfer students need to be informed about the developmental process of building a competitive record for the job market or graduate studies necessary after the baccalaureate degree. The unawareness of the importance of research and internship experiences shaped the participants perception of competition.

More research is needed to further explore the process of forming community at both the community college and four-year institution, specifically for transfer students, who must navigate two distinct institutions. What are the factors that can support transfer students during this transitional process? How does transfer students’ understanding of community shape their transfer success? What factors may have contributed to students’ gaining a sense of community? Participants in this study indicated that personal experiences shaped their perception of how a four-year institution would be like. Suarez (2003) suggested that personal hardships play a motivational role on whether students pursue an education. Research should focus how personal hardships influence the development of strategies and motivation to seek resources at a four-year institution.

A larger sample of participants should be considered to understand the role need for cognition played in the development of cognitive maps. These students indicated that the level of competition at a four-year university is overwhelming. Their perception of competition may have been overblown from their lack of information of the opportunities at a four-year institution. Future studies should look into the difference between perceived competition at a four-year institution and the actual level of competition.

References


Footnotes

1Hispanic is used in this context to describe all ethnic groups who were colonized by Spain

2Researchers chose a pseudoname to ensure the anonymity of the campuses.

3Participants chose a pseudoname to ensure their anonymity.

4Researchers chose a pseudoname for the program to ensure anonymity.
Neuropsychological Functioning Predicts Occupational Attainment in an Indian Cohort

Alex Liu

Abstract

Neuropsychological (NP) assessments have been used as predictors of broad and specific functioning. However, this usage of NP assessments has only been found mainly in western countries. It is important to be able to utilize these assessments in different countries that may have unique social, economical, and cultural identities. The aims of this study were to determine 1) whether NP scores could predict occupational attainment in an Indian cohort and 2) whether there were any cognitive domains that were powerful predictors of this relationship. Results indicate that overall NP scores are predictive of occupational complexity. Further analyses determined four significant domains (verbal fluency, speed of information processing, motor, and working memory) as predictors of attainment. As evidenced in western countries, NP measures seem to be effective at prediction of everyday functioning, such as occupational attainment, in India. This is particularly important in that India may have differing cultural and educational conditions as compared to other western countries. Despite these differences, NP assessments appear to be predictive of attainment.

Introduction

Neuropsychological (NP) assessments have been developed and used in western countries as a measure of broad (e.g., intelligence quotient) and specific (e.g., cognitive domain) functioning. These types of assessments have also found potential use as detectors of neurological deficits and as predictors of real world functioning. Heaton & Pendleton (1981) noted multiple studies that utilized neuropsychological assessments in three areas: self-care and independent living, academic achievement, and vocational functioning. The authors noted that most of the studies had used a limited range of test assessments and that more powerful tests were needed to detect specific deficits in clinical populations.

NP assessments have been used to evaluate the relationship between cognitive and work performance in different clinical populations (Kroger, et.al., 2008; Hammar, & Ardal, 2009; Gorman, et.al., 2009). For example, Andel, et. al. (2006) conducted a study with participants who had a confirmed diagnosis of Alzheimer’s disease. Extensive data were then collected on each participant’s work load (prior to diagnosis), such as complexity level and interaction with other people, data, and objects. The Mini-Mental State Examination was used to assess the rate of cognitive decline. Results indicated that individuals with higher occupational attainment had faster rates of cognitive decline. At first this seems counterintuitive. However, in the face of a neurological deficit, the brain is able to resist neurologic damage for a certain amount of time. The length of time has been linked to a person’s cognitive activities, of which employment is a major item. Therefore, individuals with more physically demanding jobs would show early, gradual signs of cognitive deficits, whereas individuals with more intellectually demanding jobs would present with late, relative fast signs of cognitive decline. This has major implications for ability to assess real world functioning in the face of a neurological deficit.

There has been relatively little research on the ability of standard clinical NP assessments to predict occupational attainment. Ackerman (1986) found that individuals with lower scores on NP assessments (speed of information processing) had fewer cognitive resources to commit to information processing. Speed of information processing is a critical component to keep track of a number of items in an individual’s memory. This process is important in intellectually demanding occupations, where numerous issues may need attention all at once. Individuals with lower speed of information processing scores may need to compensate more than individuals who have higher speeds.

In addition, to our knowledge, there have been no studies conducted in Eastern based countries that utilize NP assessments as predictors of occupational complexity. This lack of research in developing regions where social, cultural, and economic factors are different than those in the Western world has major implications on being able to use such tools in these areas. Therefore, it is
important to demonstrate the ability of NP assessments as predictors of real world functioning, especially when utilizing NP assessments that have been developed in the western world in new cultural settings. A NP battery consists of tests that measure different cognitive domains (i.e., learning/memory, executive functioning, attention/working memory, verbal fluency, and motor speed). NP assessments are utilized as a measure of cognitive function, but also as a potential predictor of everyday functioning. This is also allowing for the assumption that NP assessments predict ability to function in the real world. Under this assumption, an individual’s ability to find and maintain a job is an important consequence of being able to operate in the real world.

It is important to examine the relationship between NP assessments and their association with occupational complexity. Employment is one of the quintessential aspects of life. Most people need some type of employment to be able to generate income to clothe, house, and feed themselves. Since employment is such as critical aspect of daily functioning, it is important to assess whether NP tools are able to predict such a critical relationship. It is particularly interesting to see whether initial NP tests are able to predict occupation when controlling for demographic factors such as education or age, which are often highly correlated with occupational complexity. In addition, individuals who have poor cognitive ability early in life are found to have better cognitive ability later in life when the individual has an intellectually demanding job as opposed to a physically demanding job. Specific occupations may also emphasize certain aspects of cognition and brain activity than other occupations. Maguire, et al., (2000) found that veteran London taxicab drivers had more developed hippocampi as compared to bus drivers. These enhanced hippocampi were associated with greater spatial knowledge of London’s roads.

Usage of NP assessments is an important issue to address. As NP assessments become more prevalent in developing regions, it is crucial to establish their utility and ability to be used as an indicator of real world outcomes and predictions. India, as a representation of developing eastern regions, stands in contrast with western countries (such as the United States). It is a very populous nation, with nearly 1.3 billion people and numerous languages as national languages. In addition, close to seventy percent of the population live in rural areas and illiteracy is around thirty percent. In contrast, the United States has a predominate language (English) with several other common languages (i.e., Spanish) that are spoken by a wide percent of the population. The United States also has an illiteracy rate around one percent and a great portion of its population live in cities or suburbs.

Thus it is essential to examine whether neuropsychological performance could predict occupational complexity in resource limited areas in India, where education and employment opportunity may impact a person’s ultimate occupation. The aims of the project are to determine 1) whether neuropsychological test performance is predictive of occupational attainment in India and 2) which (if any) specific cognitive domains are particularly strong predictors of this outcome.

Method

Participants:

Fifty seven HIV seronegative individuals were recruited as part of a larger study of HIV in Pune, Maharashtra, India. Slightly more than half (54%) of the sample were men. These participants were selected to have an education level ranging from 7 to 12 years (M = 9.35, SD = 1.75). This was selected to minimize the effect of very high or very low education levels, which in turn would affect access to certain jobs which required a minimum level of education (e.g., doctors, engineers). The overall sample had a range of 21 to 57 years of age (M = 35.5 years, SD = 7.70). Exclusion criteria included significant neurologic or psychiatric disorders, loss of consciousness, and significant substance use.

Procedures:

Occupation classification was assigned on a nine point scale using the Government of India’s National Classification of Occupations (NCO; 2004), which ranked jobs according to responsibilities (e.g. skill level, economic sector, etc) as gathered from various government and private sector sources, an approach consistent with the Hollingshead Index of Social Status (1975), a frequently used measure in the United States. The National Classification of Occupations was used to analyze the data.
because it was designed with an Indian population in mind and thus would have ranks for even culturally sensitive occupations. The NCO list was first developed by the government for use in registration of applicants for jobs, as well as to document vacancies in certain fields, and for collection of statistical data. Further work was done to make the list as comprehensive as possible for India, with an emphasis to bring the NCO list in line with other international instruments. This was done so the NCO list could be used in an international context to compare statistical data for different occupations.

For this analysis, jobs were grouped into two major groups: high complexity (e.g. managers, teachers; NCO ranks of 1 to 5) and low complexity (cab drivers, sweepers; NCO ranks of 6 to 9) (Table 1). Participants completed a comprehensive NP test battery translated from English into Marathi. The NP battery measures covered seven cognitive domains: verbal fluency, speed of information processing, motor, working memory, abstraction, learning, and memory (Table 2). Raw scores were converted to mean scaled scores based on a larger normative group. This places all tests of the different domains onto a standard metric, with a mean of ten and a standard deviation of three. This is particularly useful since the tests use different units or scoring criteria. Higher scores may indicate higher performance in some tests while meaning the reverse in others. A scaled score removes these units and enables researchers to develop a standard bell shape curve with all scores placed on graph relative to each other. Initial statistical analyses consisted of overall NP battery scores on job complexity. Each demographic variable (i.e., gender, age, and education) were tested as predictors of occupational attainment. In addition, each cognitive domain was tested as a predictor of attainment. The variables that were significant at the 0.1 alpha level were combined into a larger logistical regression model.

![Figure 1: Neuropsychological Scores by Job Complexity](image)

**Results**

For initial analyses, the demographic variables of age, education, and gender were tested individually as a predictor of occupational attainment between high and low occupational groups. Age and education level were non-significant predictors of attainment. However, gender was marginally significant ($p = 0.06$), as noted in Table 3. This marginally significance disappeared in the larger models. Therefore, the high ($N = 19$) and low ($N = 38$) complexity groups were matched on age ("high" group approximate mean = 34.1, SD = 5.5; “low” group mean = 36.2, SD = 8.6) and education ("high" group approximate mean = 9.4, SD = 1.7; “low” group mean = 9.3, SD = 1.8). Gender was not matched (“high” group: males = 7, females = 12; “low” group: males = 24, females = 14). However, gender’s effect was attenuated in other multivariate models.

Finally, NP mean scale scores were significantly associated with occupational complexity ($p = 0.001$). Next, gender and mean scaled scores were combined into a model to be tested as a predictor of attainment. This model accounted for 27% of the variance in occupational attainment (Figure 1). However, gender became non-significant ($p=0.28$) while NP scaled score remained significant ($p=0.001$).

<table>
<thead>
<tr>
<th>Neuropsychological Test Battery</th>
<th>Test(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal Fluency</td>
<td>Sound, Animals, Action</td>
</tr>
<tr>
<td>Speed of Information Processing</td>
<td>WAIS-III Digit Symbol, WAIS-III Symbol Search, Trails A, Color Trails 1, Stroop Color Task</td>
</tr>
<tr>
<td>Motor</td>
<td>Grooved Pegboard</td>
</tr>
<tr>
<td>Attention/Working Memory</td>
<td>PASAT-50, WMS-III Spatial Span</td>
</tr>
<tr>
<td>Abstraction</td>
<td>Category Test, WCST-64, Color Trails II, Stroop Color Word Task</td>
</tr>
<tr>
<td>Learning/Memory</td>
<td>Verbal (Hopkins Verbal Learning Test – Rev), Visual (Brief Visuospatial Memory Test Revised)</td>
</tr>
</tbody>
</table>
significant on one cognitive area would most likely lead to significance in a related domain. In addition, since there were a broad set of occupations tested, it is not surprising that more than one occupation accesses the same cognitive areas. Thus, a test that is sensitive to one occupation is probably sensitive to other similar occupations.

Table 3. Participant Demographics

<table>
<thead>
<tr>
<th>Mean (SD)</th>
<th>Low Complexity Jobs (N=38)</th>
<th>High Complexity Jobs (N=19)</th>
<th>p values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>36.2 (8.6)</td>
<td>34.1 (5.5)</td>
<td>0.33</td>
</tr>
<tr>
<td>Education (years)</td>
<td>9.3 (1.8)</td>
<td>9.4 (1.7)</td>
<td>0.83</td>
</tr>
<tr>
<td>Sex (% male)</td>
<td>63.16 %</td>
<td>36.84 %</td>
<td>0.06</td>
</tr>
</tbody>
</table>

This is important to show that western based measures of cognition (once validated in the developing region) can be utilized in developing regions where limited resources (such as educational or employment opportunity) may restrict individuals from pursuing higher education or employment. Despite these limitations, the NP battery is still able to parse out individuals who have intellectually demanding work, yet may not have had numerous years of education.

Neuropsychological assessments have had a long history of usage. For example, Potter, Helms, and Plassman (2007) found that, in a study of World War II veterans, individuals with lower intellectual ability in early life had better cognitive performance in late life when these individuals had an intellectually demanding occupation. Individuals who participated in this study had taken either the Army General Classification Test (AGCT) or the General Classification Test (GCT). These tests were administered to United States military personnel in the beginning stages of US participation in WWII and were touted to be a “test of general learning ability” (Potter, 2007). Years later, participants were administered the Modified Telephone Interview for Cognitive Status” (TICS-m), which offered a brief assessment of cognitive status that can be directed over the telephone. Results indicated that individuals with more physically demanding work had lower levels of cognitive ability years later. In addition, participants who had low scores on the general ability tests benefited the most from intellectually demanding work. These individuals had higher cognitive levels than individuals that had low scores initially and found employment in more physically demanding occupations. This has important implications in how NP assessments are

Table 1. Government of India’s National Classification of Occupations List

<table>
<thead>
<tr>
<th>Divisions</th>
<th>Occupations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Legislators, Senior Officials, and Managers</td>
</tr>
<tr>
<td>2.</td>
<td>Professionals</td>
</tr>
<tr>
<td>3.</td>
<td>Technicians and Associate Professionals</td>
</tr>
<tr>
<td>4.</td>
<td>Clerks</td>
</tr>
<tr>
<td>5.</td>
<td>Service Workers and Shop/Market Salespersons</td>
</tr>
<tr>
<td>6.</td>
<td>Skilled Agricultural and Fishery Workers</td>
</tr>
<tr>
<td>7.</td>
<td>Craft and Related Trades Workers</td>
</tr>
<tr>
<td>8.</td>
<td>Plant and Machine Operators and Assemblers</td>
</tr>
<tr>
<td>9.</td>
<td>Elementary Occupations</td>
</tr>
<tr>
<td>X. (not included in analyses)</td>
<td>Workers not classified by occupations</td>
</tr>
</tbody>
</table>
used as predictive tools for future occupations, as well as utilizing these same assessments to measure cognitive ability over a lifespan. In addition, neuropsychological assessments have been used to examine cognitive resources and everyday functioning in individuals with mental or neurological disorders. Individuals with a diagnosis of severe mental illness who found independent employment, as opposed to supported employment or unemployed, were found to have better psychomotor speed and executive functioning (McGurk, 2003). Van Gorp (1999) found that individuals with Human Immunodeficiency Virus (HIV) symptomatic who were employed exhibited better NP performance than their unemployed counterparts. Unemployed individuals had lower performance in tasks of learning efficiency and executive functioning. These two domains are important predictors of which individuals who will remain fully employed versus those who will reduce or quit work. Andel (2006) suggested a link between occupational complexity, associated with employment titles and rate of cognitive decline in Alzheimer’s patients. This study found that individuals who had high levels of occupational complexity had a faster rate of decline. This effect remained even after controlling for age, gender, dementia severity, and education.

Future directions for this research include recruiting more people into the study. Since this study is part of a larger longitudinal study of HIV in India, there have been more assessments following baseline measurements. In these follow up appointments, more detailed occupational history and descriptions were gathered from each participant. This will enable individuals who were not able to participate in this study to be included in future studies. With a bigger sample size and better statistical power, it will be possible to conduct cross job comparisons between specific occupations with different levels of intellectually demanding workloads. For example, it might be possible to compare truck drivers (NCO rank 7) with primary school teachers (NCO rank 2). There has already been previous research into how specific occupations such as taxi cab drivers (Maguire, et.al., 2000) have more developed hippocampi across a lifetime of doing such work.

Finally, one major new direction would be a large scale study of occupational attainment in the United States. There is relatively little research in this area and future research in this field would bring further validation of the usability of NP assessments as predictors of real world functioning.

Some limitations of this study include ambiguous job descriptions. In addition, there were far more males than females in the overall control population, therefore, while gender could be controlled for in the specific analyses, we cannot generalize results to the rest of the individuals in the control group. This also resulted in a limitation of a smaller sample size.
References


An Analysis of Peer Delinquency’s Mediational Effect on Delinquent Behavior and Relationship Violence

Rachel Dyson

Abstract

The link between relationship violence perpetration and delinquent behavior is a prevalent social issue that affects relationships of all demographics and status (i.e., casual dating partners, committed relationships, married couples, etc.). The effects of relationship violence are widespread including low self-esteem, risky sexual behavior, drug and alcohol abuse and depression. Similarly, delinquent behaviors have been linked to a number of adverse effects (i.e., lower socioeconomic status, drug and alcohol abuse, risky behavior, etc.). Similarly, the influence of peer delinquency has also been linked both relationship violence and delinquent behaviors throughout the literature. However, limited research has explored the mediational role of peer delinquency on the relationship between delinquency and relationship violence perpetration. This study aims to clarify this relationship and analyze the role that peer delinquency plays in mediating these two variables. 455 college students ages 18-24 completed an online survey assessing dating behavior. The SAGE Baseline survey was included to measure levels of individual and peer delinquency, while the CTS was used to measure both perpetration and victimization of dating violence. A mediational model was tested to determine if peer delinquency mediated the relationship between dating violence perpetration and delinquent behavior. Delinquency was positively correlated with dating violence perpetration ($\beta$=.134, $p=.012$), and peer delinquency ($\beta=.41, p<.00$). A third regression analysis revealed that peer delinquency was not significantly correlated with dating violence perpetration ($\beta=.002, p=.973$). Due to this non significant result, no further analyses were run. These results should be considered for possible prevention and intervention methods along with future research implications.

An analysis of peer delinquency’s mediational effects on delinquent behavior and relationship violence

Delinquent behavior and relationship violence are two dangerous actions that can threaten the safety and peace of a community. Because they often co-occur, the relationship between delinquency and relationship violence is important in understanding both variables’ detrimental effects on the victim and the perpetrator’s physical and emotional processes. The extensive list of possible mediators between relationship violence and delinquency span across levels of social interaction; including, individual, family, peer, and community influences (Sanchez, R. L., 2008). The influence of peer delinquency on both behaviors has been recognized as a significant correlate; however literature investigating its mediating effect between delinquency and relationship violence is limited. This study explores the relationship that delinquent peers have on a person’s tendency to engage in aggressive behaviors both generally and within their intimate relationships. In doing so, we aim to better understand the etiology of delinquent behaviors and its connection to relationship violence.

Relationship violence is a serious issue with detrimental and potentially long lasting effects. Approximately 20-50% of adolescents and young adults are or have been involved in some sort of physical, sexual or emotional abuse in their current or past relationships (Centers for Disease Control and Prevention, 2010, p. 1; Bergman, 1992; Foshee et al., 1996; Makepeace, 1981). These instances of abuse have the potential to affect psychological and physical processes of both the victim and the perpetrator and may have long lasting effects on their social and interpersonal interactions.

For the purposes of this study, only the perpetration of dating violence was considered in the mediational model. While past research has typically focused on the victims of dating violence, targeting perpetrators of this abuse may lead to better prevention or intervention. Possible
Predictors of perpetrating dating violence include dating violence victimization, high levels of acceptance of violence, parental conflict and having delinquent friends. The effects are also widespread; encompassing outcomes such as low self esteem, drug and alcohol abuse, and other risky or criminal behaviors (Silverman, Raj, Mucci, & Hathaway, 2001).

The behaviors and actions included in this definition of abuse can range from mild (pushed, grabbed, shoved) to severe (bruised their partner, broken bone[s], bloody noses and internal bleeding), with the potential to cause great bodily injury (Foshee, 1996; Molidor & Tolman, 1998). Although these severe cases are relatively more rare, they are still a great concern to those experiencing or investigating these abusive behaviors. The idea of relationship abuse should not be narrowly understood as physical confrontation, but rather, can include, emotional, sexual and verbal abuse. While it may not have the same characteristics of physical abuse, these behaviors can cause chronic physical, and psychological symptoms in the victims. Bookwala et, al (1992), found that the type of abuse used by different individuals may be predicted by a number of factors including levels of acceptance of violence, attachment styles, communication skills, impulsivity and satisfaction with life. The current study looked at the perpetration of psychological, verbal and physical abuse in order to understand the model’s ability to generalize across all forms of relationship violence.

According to some, all of these forms of abuse can typically begin in adolescence, with the potential to continue into the beginning years of marriage (Chase, Treboux, O’Leary, 2002). Without recognizing these behaviors and confronting them with solutions, many new marriages may also be plagued by this dangerous behavior. Research suggests that young adults who exhibit the predictors of abuse explained earlier, are at a higher risk for committing physical, sexual and emotional abuse (Herrera, Wiersma, & Cleveland, 2008). Furthermore, individuals are at much more risk of engaging in these abusive behaviors if and when they are involved in other more general aggressive or criminal behaviors, referred to here as delinquent behavior.

Delinquent behavior, including crimes committed by young adults continues to be a social concern, nuisance and threat. For the purposes of this study, delinquent behavior can be defined as any antisocial or illegal behavior committed by an individual, which society deems as inappropriate or unacceptable (Vitulano, Fite, & Rathert, 2010). This may encompass behaviors such as property offenses (graffiti, vandalism, theft, larceny, etc.), violent offenses (rape, assault, harassment, battery, murder), and status offenses (truancy, minor in possession of alcohol, negligence of curfew, affiliation with known criminals). In 2009, young adults ages 18-24 represented 16% of all incarcerated adults in prisons across the country (Bureau of Justice Statistics. 2009). Alarmingly, these statistics only report documented arrests, convictions and clearances. The actual prevalence of adolescent and young adult delinquency is expected to be much higher than these concrete statistics due to lack of reporting and inadequate investigations and responses by law enforcement. Statistics report that approximately 62.5% of all released prisoners in the 1980’s were rearrested within 3 years of their release for another, related, serious criminal offense, suggesting the stability of aggression across similarly violent situations (Bureau of Justice Statistics 1983). In a study conducted by Brendgen, Vitaro, Tremblay and Wanner, data revealed that 58.5% of adolescent boys who aggressed in more general, community settings also aggressed against their intimate partners. This supports the notion that general patterns of aggression may explain more specific instances of partner abuse. Looking at this stability of aggression, there is need for a better understanding of the effects delinquency plays on a person’s likelihood of relationship violence perpetration. Thornton, Graham-Kevan and Archer discussed in their research that violent, nonviolent and intimate partner violence offending overlapped in their prevalence, further supporting the relationship between general delinquency, and concurrent or later relationship violence.

Similar to relationship violence, the predictors of delinquency can be widespread and may include, truancy, lack of family support, psychological disorder, acceptance of violence, poor communication skills, low self-esteem and drug abuse (Singh 2009, Warkentin 2010). As a result, delinquents have a higher tendency for less education, lower income, incarceration, risky sexual and health behaviors and suicide (Clingempeel & Henggeler 2008).

With delinquency posing such a danger to those involved, a number of explanations have been constructed to understand this behavior and its connection to relationship violence. One of the leading psychological approaches is the idea of social learning theory (SLT) which states that individuals learn behaviors and attitudes by observing models in their environment (Watt, Howells, Delfabbro, 2004; Winfree, Bäckström,
Much of the research on delinquency, especially in young adults, has debated the origins of this behavior pattern. They conclude that while the person is responsible for the decisions they choose, outside factors such as living situations, family environment and peer attitudes may have an influential power over how those decisions are made (Cornish, D. 1993, Harding 1993).

Despite extensive research on these theories, the origins of delinquent behavior and relationship violence are both unclear. While numerous mediators have been considered, associating with delinquent peers has been found to be a strong predictor of both criminal, and relationship violence (Brownfield, D., Thompson, K. 2002, Dishion, T. J., Spracklen, K. M., Andrews, D.W., Patterson, G.R., 1996, Casey, E., Beadnell, B. 2010).

As was discussed earlier, the individual may learn the techniques, rationalizations and coping mechanisms of engaging in delinquent behavior by interacting with their close associates. Peer groups are an essential part of the socialization process, and one of the key determinants of an adolescent’s behaviors, beliefs and attitudes (Casey, E., Beadnell B, 2010. Mcnelles, L., 2000). Peers are the first social agent that, aside from the family, forms a tight social bond with the individual (Dishion, T. J., Andrews, D. W., Crosby, L., 1994, Mcnelles, L., 2000) Unlike the family however, peer groups are less inhibited to bolster self-esteem, and they serve as the first group to offer a truthful judgement about the individual. In a sense, they are a halfway point between the intimacy of a family, and the superficiality of society.

Developmentally, peer networks and friendships formed during adolescence serve not only as a fostering environment for identity development, but as a firsthand learning situation from which individuals form their beliefs, discover moral and social norms, and decide their own attitudes toward societal expectations (Dishion, T. J., Spracklen, K. M., Andrews, D.W., Patterson, G.R., 1996, Keenan, K. et al, 1995). In attempts to strengthen bonds with peers, young adults may follow their advice and behaviors, despite their possible negative consequences.

Peer delinquency can be defined as any illegal, antisocial or deviant behavior committed by an adolescent’s friends or acquaintances; people that they interact with on a regular basis. This may include any of the violent, property or status offenses mentioned earlier, as well as drug and alcohol abuse, harassment, and lewd or vulgar behavior. Individuals may associate with delinquent peers for a number of reasons. These factors may be internally based (i.e., low self-esteem, idolization, inadequate social skills, antisocial behaviors, etc.) or externally based (i.e., family monitoring and discipline, school tracking systems, relative proximity) (Snyder, J. J., Dishion, T. J.,
Patterson, G. R., 1986). Acceptance and instrumentation of violence and delinquency and deviance by individuals via peer networks has a number of theoretical underpinnings including social learning theory, and a change in attitudes toward violence and aggression. A study by Huesmann and Eron examined the stability of aggression over time and across generations. They outline that aggression persists when the child or adolescent has “the appropriate learning conditions” in which they can repeatedly observe the aggression both as the giver and the receiver. Other research has suggested that the overlap between delinquency and relationship violence reflects a more general pattern of violence and aggression that can be learned by both parents and peers (Brendgen, M., Vitaro, F., Tremblay, R., Wanner, B. 2002, Casey, E., Beadnell, B. 2010). This overall tendency to use aggression may be the result of reinforcements by the peer networks and the individuals ability to receive a desired outcome from that violence. Brendgen, Vitaro, Tremblay, and Wanner termed this process as “deviancy training”, in which peers teach the adolescent that the rewards of using aggression will most always outweigh the costs. They too found that a violent modeling process encourages teens to aggress in both delinquency related and dating relationship contexts.

Despite the strong connections to both delinquency and relationship violence, limited research can be found on the mediational powers of associating with delinquent peers. Moreover, research on perpetration of both variables is somewhat disproportionate to that of victimization. This study seeks to clarify the mediatational power that peer delinquency has over the relationship between delinquency and relationship violence. Given the central influence of peer networks on adolescents and young adults, it is hypothesized that there will be a strong relationship between delinquency and relationship violence, delinquency and peer delinquency, and peer delinquency and relationship violence. It is also hypothesized that peer delinquency will mediate the relationship between delinquent behavior and relationship violence.

Method

Participants

There were 458 participants total who were eligible for and completed the entire survey. Of these 458 students, there was a mean age of 20.28 (SD=3.456). The population was made up of 101 male participants, and 354 female participants, and 3 unidentified participants. The distribution across race/ethnicity is seen in Table 1. It should be highlighted that a majority of participants (48.9%), were of white or caucasian descent. This distribution may be an important factor for understanding the results of the sample.

Procedure

This study was part of a larger study on dating behavior. An online survey was constructed to assess dating behaviors of college age students. The survey was approximately 800 questions long, requiring an average of one and a half hours to complete. The questions covered not only the variables important to this study, but was part of larger study about dating violence and behaviors. Participants were required to be at least 18 years or older, have had at least one dating experience in the last year, and could not be currently married. The survey was posted to a participant pool for Psychology 101 students, wishing to fulfill the required research credits for the class. Each of these students received class credit for participating in the survey. It was also distributed to students enrolled in Psychology 301, an upper division research class. These students were given extra credit for completing the survey. Due to the order in which these classes were notified and issued the survey, we reserved the ability to separate the data based on class enrollment (Psych 101 vs. Psych 301) when considering the data.

Before beginning the survey, students were given a brief explanation of the study, its relative time commitment, the confidentiality agreement and a brief tutorial on how to submit answers. The description read as follows: “In this study, you will be asked to answer several questions relating to your own experience with dating violence. In order to participate you must not be married, must have had at least one dating experience within the last year, and at least 18 years of age.”

Once directed to the online survey the brief introduction read as follows: “The youth dating violence lab is conducting a study to learn more about dating behaviors and attitudes of college students. You will be asked to answer some sensitive questions about things that may relate to your dating relationships, such as questions about your mood, abusive behaviors (e.g., physical, sexual coercion), and family relationships. If you are a Psychology 101 student, you will receive one research credit. The survey could take up to 60 minutes”.

Participants were able to complete the survey under their own conditions and on their own time. Upon finishing their survey, students were given a
debriefing statement and resources for local counseling. Participants were informed of the voluntary and confidential nature of their responses, and assured class credit for their participation, regardless if they discontinue their participation at any time. Moreover, because the surveys were electronically completed, research personnel were unable to match participants to their survey, ensuring a high level of anonymity and confidentiality.

Measures

Delinquent and Peer Delinquent Behavior
The SAGE Baseline Scale (Straus, 1979) is a 12-item self-report measure of delinquent and aggressive behavior in adolescents and young adults. Participants are asked the last time they committed a specific act. Items are scored on a 5-point scale with responses ranging from “Never”, to “Within the Past Month”. There were twelve items included in this scale, all of which were used to assess delinquent behavior. The 12 items could further be broken down into two sub scales with 8 direct aggression items (i.e., “I threatened someone with a gun or a knife”), with an alpha of .795 and 4 indirect aggression items (i.e., “I watched a fight”) with an alpha of .379. The same questions were used to assess delinquent behaviors by the participants’ peers. The beginning statement was slightly modified to say “The following questions refer to your peer’s involvement in specific actions. For the purposes of this survey, a peer can be defined as a friend, classmate or acquaintance whom you regularly hear about. To the best of your knowledge, when was the last time one of your peers...”. The reliability of the SAGE Baseline survey was .84 (Rosenbaum et. al., 1991; Paschall and Flewelling, 1997).

Relationship Violence Perpetration
The Revised Conflict Tactics Scale (Straus, Hamby, & Warren, 2003) is a 78-item scale that assesses both victimization and perpetration of dating violence. Items are answered on an 8-point scale ranging from “0- This has never happened” to “6- More than 20 times in the past year”. An answer of “7- Not in the past year, but it did happen before” was also available for participants. 39 of the questions (half of the survey) were related to perpetration of relationship violence. The other 39 were related to victimization and were not used in this study. These 39 item assess the participant’s perpetration of different forms of abuse such as physical assault, psychological aggression, sexual coercion, negotiation and injury. There are three different subscales of perpetration, including emotional perpetration (α=.798), physical perpetration (α=.800), and sexual perpetration (α=.295). The questions on physical assault can be grouped in to two basic sub sets, mild or severe. The CTS-2 was designed to assess individuals who were currently or recently (within the past year) involved in dating, cohabiting or marital relationships. The reliability of the total CTS-2 was reported high with an alpha of .90 (Mechanic et. al., 2000b).

Results

Preliminary Analyses
A correlation matrix was constructed to assess the relationships between each of the variables in the study. Descriptive statistics, as reported above, were also obtained at this time. See table 4.

Table 1. Regressions between peer delinquency and delinquency

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>β</th>
<th>df</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer Delinquency (Overall)</td>
<td>0.378</td>
<td>(1, 428)</td>
<td>8.446</td>
<td>0.000</td>
</tr>
<tr>
<td>Delinquency (Direct)</td>
<td>0.332</td>
<td>(1, 429)</td>
<td>7.284</td>
<td>0.000</td>
</tr>
<tr>
<td>Delinquency (Indirect)</td>
<td>0.41</td>
<td>(1, 421)</td>
<td>9.222</td>
<td>0.000</td>
</tr>
<tr>
<td>Delinquency (Overall)</td>
<td>0.366</td>
<td>(1, 433)</td>
<td>8.172</td>
<td>0.000</td>
</tr>
<tr>
<td>Peer Delinquency (Direct)</td>
<td>0.3</td>
<td>(1, 435)</td>
<td>6.547</td>
<td>0.000</td>
</tr>
<tr>
<td>Delinquency (Indirect)</td>
<td>0.389</td>
<td>(1, 426)</td>
<td>8.696</td>
<td>0.000</td>
</tr>
<tr>
<td>Delinquency (Overall)</td>
<td>0.291</td>
<td>(1, 438)</td>
<td>6.353</td>
<td>0.000</td>
</tr>
<tr>
<td>Peer Delinquency (Indirect)</td>
<td>0.309</td>
<td>(1, 439)</td>
<td>6.807</td>
<td>0.000</td>
</tr>
<tr>
<td>Delinquency (Overall)</td>
<td>0.336</td>
<td>(1, 431)</td>
<td>7.39</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table 2. Regressions between peer delinquency and relationship violence perpetration

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>β</th>
<th>df</th>
<th>t</th>
<th>p</th>
</tr>
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<tbody>
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<td>7.39</td>
<td>0.000</td>
</tr>
</tbody>
</table>
Independent Variable | β   | df  | T   | p   
--- | --- | --- | --- | --- 
**Peer Delinquency (Overall)**  
Sexual Perpetration | -0.086 | (2, 396) | -1.556 | 0.120 
Emotional Perpetration | 0.045 | (2, 379) | 0.786 | 0.435 
Physical Perpetration | 0.036 | (2, 380) | 0.64 | 0.523 
Perpetration (Overall) | 0.002 | (2, 336) | 0.033 | 0.973 
**Peer Delinquency (Direct)**  
Sexual Perpetration | -0.086 | (2, 401) | -1.581 | 0.115 
Emotional Perpetration | 0.021 | (2, 384) | 0.38 | 0.704 
Physical Perpetration | 0.012 | (2, 384) | 0.218 | 0.828 
Perpetration (Overall) | -0.010 | (2, 340) | -0.168 | 0.866 
**Peer Delinquency (Indirect)**  
Sexual Perpetration | -0.047 | (2, 405) | -0.892 | 0.373 
Emotional Perpetration | 0.081 | (2, 386) | 1.476 | 0.141 
Physical Perpetration | 0.080 | (2, 387) | 1.492 | 0.137 
Perpetration (Overall) | 0.039 | (2, 324) | 0.662 | 0.508 

**Primary Analyses**
The first regression analysis between delinquent behavior and perpetration of dating violence yielded significant results (Table 3). As hypothesized, participants that engaged in delinquent behaviors were more likely to perpetrate violent behaviors within their relationships, than those who were not engaged in general delinquent behaviors. A second regression analysis confirmed a significant relationship between delinquent behaviors and delinquent behavior of one’s peers (See Table 1). That is, participants that were involved in delinquent behavior also associated with delinquent individuals within their peer networks more frequently than did those who were less involved in delinquent behaviors. Contrary to
hypotheses, a third regression analysis revealed that the relationship between peer delinquency and perpetration of relationship violence, while controlling for participant delinquent behaviors, was not significant (See Table 2). This illustrates that interacting with delinquent peers was not a reliable predictor of whether or not a participant would perpetrate violence within in their intimate relationships.

Secondary Analyses
Due to this non significant regression, we separately analyzed the sub scales of the SAGE Baseline scale, split between direct and indirect measures. Separate regressions were run again between direct peer delinquency and perpetration of relationship violence, as well as indirect peer delinquency and perpetration of relationship violence (Table 2). Unfortunately, neither one of these regressions yielded significant results. Further regressions were run using each of the sub scales of the CTS (sexual, emotional and physical). Three individual regressions were run between peer delinquency and each sub scale, however, no significant results were found (See Table 2). With these results, it can be concluded that the overall model failed to accurately predict the power of peer delinquency as a mediator between delinquency and relationship violence (See Figure 1).

Discussion
The purpose of this study was to examine the relationship between delinquent behavior, perpetration of relationship violence and delinquent peers. We also aimed to analyze the mediational effects of peer delinquency on perpetration of relationship violence and delinquent behavior. Three linear regressions were run to test our hypotheses.

The first regression, testing the relationship between delinquency and perpetration, was significant. Meaning that those individuals who engaged in overall delinquent behavior were more likely to engage in the specific act of abuse against their partner. The theoretical basis for this result was discussed earlier in a study by Thornton, Graham-Kevan and Archer who found that both violent and nonviolent offenses overlapped with relationship violence in prevalence. This relationship would seem a logical outcome and could possibly be the result of both poor communication and coping skills in that those individuals who cannot properly cope, or seek assistance for their problems, may instead aggress or lash out. From the perspective of the social learning theory, these individuals have acquired certain experiences that have taught them the rewards of acting violently, and consequently reinforced this behavior. Moreover, the behaviors being taught in the individual’s environment under general circumstances of delinquency, aggression, etc., are also applicable in the specific setting of a romantic encounter. Relationship violence can be considered a particular subset of a more overarching delinquency pattern. Therefore, it would be expected that those individuals participating in other areas of delinquent behavior would also be more likely to participate in the perpetration of relationship violence.

Our second regression tested the relationship between delinquent behavior and delinquent peers. This significant regression suggests that those individuals associating with delinquent peers also engaged in aggressive and criminal behaviors. This result is heavily supported by past research, and can be attributed to a number of psychological and sociological theories. As discussed earlier, differential association considers an individual’s peers a network of associates who can teach, counsel and advise a person on the techniques necessary to engage in delinquent behaviors, including ways to manage and avoid consequences. Unlike community and family influences, peer networks form a unique social bond with the individual that promotes both assimilation and acceptance of specific behaviors. This result may be explained by this social expectation to conform with the behaviors and values of a group in order to gain acceptance and praise from said group. The social learning theory further establishes that by associating with individuals or groups involved in deviant behavior, an individual is exposed to the rewards of these actions including acceptance, praise and bragging rights, as well as material rewards (i.e., monetary, drugs, alcohol, weapons, etc.). These rewards offer ample incentive for committing these behaviors and would logically explain the strong relationship between delinquency and association with delinquent peers. The results of this study support this theory and suggest that by witnessing “models” engaged in delinquency, paired with a specific reward, individuals were motivated and even encouraged to behave in a similar way.

The temporal causation of this relationship cannot be inferred however, and so this relationship may also be reversed, in that individuals who engaged in delinquent acts sought out other individuals similar to themselves in behavior and activity. By seeking out other individuals who condone and even participate in these typically
deviant behaviors, delinquent individuals can assuage feelings of guilt or shame, while also learning ways of managing this negative societal response. Essentially, this association with similar peers can fill the basic need for acceptance and connection within a group.

Our third regression testing the relationship between peer delinquency and relationship violence yielded insignificant results. Contrary to hypotheses, those individuals who were aware of, or associating with delinquent peers were not significantly perpetrating relationship violence. The reverse of this relationship is also possible. Those perpetrating relationship violence were not significantly associating with delinquent peers. Although this was not the predicted outcome, there are a number of primitive explanations to be drawn and reflected on. For individuals who reported association with delinquent peers, the nature of this relationship could play a large role on the impact their behavior had on our participants. In situations where bullying or victimization by a peer occurs at the participant’s expense, there may be little overlap between witnessing delinquent behavior and engaging in relationship violence. Moreover, if the relationship with these delinquent peers is forced, as in the setting of gang activity, the individual may feel pressure to commit the same delinquent acts as their peers out of fear or apprehension, without necessarily carrying over these attitudes to an intimate relationship. In both instances, individuals may not necessarily condone the behaviors committed by their peers, and so will not reflect these attitudes in a more intimate setting. Essentially, the power of the individual belief system is a large factor in determining whether a person will engage in modeled behaviors.

Continuing with the nature of the relationship between the peer(s) and the individual, the strength and intimacy of the relationship is important for understanding its influence on the participants behavior. For the purposes of this study, a peer was defined as “a friend, classmate or acquaintance whom you regularly hear about”. The intimacy between a close friend and a passive acquaintance ranges considerably, with the opinions and behaviors of the former typically having a weightier effect on behavior than the latter. Future research should consider including a more specific definition of a peer, or integrate open-ended questions allowing participants to clarify the nature and intimacy of the relationship to these delinquent affiliates.

A third consideration explaining this insignificant finding is the interference of other extraneous variables. Despite the influence of a delinquent peer on an individual, there are an indefinite amount of positive variables (both internal and external) with the potential to moderate this effect. Outside factors such as positive family values, involvement in school and community enrichment activities and even competing positive peer attitudes can allay the effects of a delinquent peer. Other internal factors such as communication and problem solving skills,
effective coping approaches and positive outlook can work to temper these reprehensible behaviors.

A final consideration focuses on the mode of observation by which the individual learns about this delinquency. The definition of this study identified peers as anybody the participant may regularly hear about. This insinuates that a participant may not have actually seen the act being carried out, but rather heard about it in passing, or from another peer. This indirect exposure to delinquent peers may mute the influence it has on an individual’s behaviors. Research has suggested that being an actual witness to a delinquent act can have a much stronger influence on an individual’s behavior than simply hearing a rumor from friends. Having tangible evidence to model their behaviors around is much easier than visualizing and potentially imagining the series of events they are told their peers committed. Moreover, witnessing this delinquency may project feelings of uncertainty and a breach of safety in one’s environment and may work to trigger more delinquent behaviors as a type of survival response. No such reaction is found for those hearing rumored accounts of another person’s delinquency (Kort-Butler, 2010). This should be considered in future research where the effects of one peers’ behavior on another is of interest. Especially where aggressive delinquency is being studied.

There are potential limitations of the study design that could have an effect on the outcome and implications of this research. The CTS, used to examine instances of relationship violence perpetration, was found to be highly skewed, with an overwhelming proportion of the participants reporting little to no instances of abuse. The college age sample population also threatens the generalizability of these results, as they represent a very small and specific subset of overall society. The proportion of male to female participants was uneven, with more than twice as many females in the sample as males. Future research should aim to moderate this proportion. As is an issue with most online surveys, the privacy allotted participants was very high, with very low control by the research personnel. This independence allowed participants to confer with others, and also kept researchers from verifying or clarifying the true nature of a participant’s answers. However, this method was used due to its ability to reach a larger population, while also ensuring participant anonymity and confidentiality.

There are a number of suggestions for future research in the area of peer delinquency and relationship violence. Research should focus more closely on the intimacy and nature of peer relationships, and attempt to understand the divide between close friends and acquaintances. There should also be a stronger focus on the acts that are being committed, and might include behaviors such as property and status offenses, both of which were not included in this survey. Future research would benefit from targeting higher-risk, younger and more diverse populations, so as to gain a richer insight into populations that are most affected by these issues and behaviors. There is also a need for research considering variables moderating the relationship between peer delinquency and relationship violence. Prevention programs should focus on the strong relationship between delinquency and relationship violence, and the conclusion that aggression is stable over time and situation. Lastly, prevention and community programs should make note of the strong influence the peer network plays in the formation of young adults behaviors and beliefs. Focus groups and community outreach programs can especially benefit from these conclusions.

References


The Profile of Prospective Memory Impairment in Older Adults and Implications for Everyday Functioning

Brittnie Bloom

Abstract
Prospective memory (ProM) is a critical aspect of episodic memory that involves remembering to carry out an intended action at a specific time in the future and is thought to be critical for everyday functioning. Prospective memory tasks are commonly divided into 1) event-based tasks (EB), in which a specific cue in the environment triggers the retrieval of a previously formed intention (e.g., seeing a grocery store reminds one to buy dinner on the way home from work) and 2) time-based tasks (TB), in which retrieval of an intention is cued by a specific time or time interval (e.g., remembering to take medication at 2pm or every 4 hours). A growing body of literature suggests that ProM is dependent on the functional integrity of the frontal lobes and their associated executive functions, with time-based ProM relying more heavily on executive processes than event-based ProM. ProM deficits have been reported in older adults; however, previous studies have yielded inconsistent findings, perhaps due to the use of nonstandardized ProM measurements. In addition, the relationship between ProM and everyday functioning in aging has not been adequately investigated. The present study investigated ProM in nondemented older adults using a standardized ProM task, the Memory for Intentions Screening Test (MIST), which assesses EB and TB ProM. The participants also completed instrumental activities of daily living (IADL) measures, which are higher order functional abilities critical to independent living. The results showed that older adults displayed no significant differences in EB and TB ProM on the MIST, but yielded a significant relationship between EB and TB ProM and the IADLs. This study may have implications for the formal assessment of ProM during clinical evaluations of neuropsychological function in older adults. The study also could lead to the development and implementation of interventions aimed at teaching compensatory cognitive strategies for ProM dysfunction to improve everyday functioning and quality of life older adults.

The “graying of America” is a term often used to describe the demographic changes that have occurred over the past 100 years in America. These changes have resulted in older persons no longer being an invisible and largely forgotten minority group. In 2002, the United Nations described this aging of the people as “unprecedented, pervasive, and enduring” with “profound implications for many facets of human life.” By 2014, it is thought that, for the first time, there will be more older people than younger worldwide, and by 2030, the 65 and older population will make up more than 20% of the entire population (Armbrust, 2001). As the population grows older, the age structure of society changes. In the first part of the last century, the societal structure of age resembled a pyramid with younger persons making up the large foundation, adults in the middle and older adults making up the narrow top. Presently, the societal structure’s older population and younger population are similar in number; the number of adults that fall in the middle has significantly increased and currently makes up the largest population in the United States. Eventually, the pyramid structure that was present at the first part of the century will become inverted, with a small base of younger people and older adults creating the large top (Administration on Aging, 2003).

Although people are living longer because of improvements in medical care, the increasing ability to treat chronic diseases and the eradication of many of these diseases, there are many concerns with the aging population. Since people can now expect to live more than one-third of their lives as older persons, research in aging is not only important, but personal. As the population ages, the risks for cognitive decline threaten independence and quality of life for older adults (Williams & Kemper, 2010). There is substantial evidence that both working memory and long-term memory decline with age and older adults are thought to have reduced cognitive resources available for engaging in resource demanding tasks (Smith & Bayen, 2006). Additionally, episodic memory may be a key to understanding cognitive impairments in older adults. Research shows that episodic memories may depend on various cortical regions, such as the temporal and frontal lobes (Peters & Daum, 2009). The Baby Boomer population is of specific interest to researchers in aging. Lauren
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Vogel (2011) states that the Baby Boomers are not ready for the “onslaught” of dementia. For the first round of Baby Boomers turning 65 this year, their risk of developing Alzheimer’s Disease (AD) will double every five years. The Alzheimer’s Association (2008) states that of the 78 million Baby Boomers, 10 million will develop AD. A similar future is depicted in a Canadian-based study, that refers to this phenomenon as a “forthcoming epidemic,” which will lead to the number of individuals in Canada living with AD and other types of dementia increasing to 1.125 million in 2038 from 500,000 in 2008 (Vogel, 2011). Given these statistics, it is no wonder that cognitive decline is one of the greatest concerns and threats for aging adults.

Aging in humans is associated with some certain “normal” structural and neuro-physiological changes in the brain and various levels of cognitive decline. Research shows that some areas of the brain that interact in order to activate higher-order cognitive functions are less coordinated as individuals age. Magnetic resonance imaging studies in healthy aging adults showed an increase in age is associated with volumetric decreases in the frontal lobes, temporal lobes and the hippocampus (Coffey, Wilkinson, & Parashos, 1992). Specifically, neural activity becomes less localized in the prefrontal cortex, which is responsible for executive functioning (Bishop, Lu & Yanker, 2010). Executive functioning is known as higher-order cognitive abilities and include processes such as planning, inhibitory control, and cognitive flexibility that are critical for carrying out goal-directed behaviors and the ability to adapt to new situations (Lezak, Howieson, & Loring, 2004). The effects of aging on the prefrontal cortex also affect source memory and temporal order memory. Source memory is related to the context from which a specific item was acquired by an individual (Awipi & Davachi, 2008) and temporal order memory is thought to play a critical role in the organization of sequences of events because of its role in the mediation of cross-temporal contingencies (Fuster, 2000). Ziegler et al. (2008), found that healthy aging resulted in cortical thinning of the white matter and gray matter in the brain. Cortical thinning of the white matter is associated with poor episodic memory (Kennedy & Raz, 2009). These higher-order cognitive abilities have particular implications for an individual’s ability to care for themselves and the overall quality of their daily lives.

Most research in aging concentrates on retrospective memory (memory for past events and experiences), but prospective memory (ProM) has become a subject of interest to researchers who focus on aging. ProM is thought to involve multiple cognitive processes dependent on the integrity of the frontal lobes that involve processes such as planning, working memory and inhibition. It is often defined as the ability to “remember to remember” something. ProM is thought to play a critical role in many everyday activities such as remembering to take medication or pay bills. There are a few standardized ProM tasks that can be used to examine and better understand this memory process. ProM tasks include a delay interval between the formation of an intention and carrying out the intention (Ellis, 1996). This is why ProM is said to test the ability to remember an intention at some point in the future. Also, ProM tasks are embedded in another ongoing activity (McDaniel & Einstein, 2007). The individual may observe their environment for the appropriate circumstance or cue to carry out an intention, but this occurs as a background activity. With ProM tasks, there is no explicit reminder to carry out the intended action at the correct time. This makes ProM tests different from traditional retrospective memory tests; there is no explicit cue to remember. ProM tasks require the participant to detect the appropriate cue on their own and stop whatever task they are currently involved with to carry out an intention (Knight, 1998). Finally, the amount of time given for the initiation of a response and execution is limited; there is a particular window of time and opportunity to execute the necessary ProM task. Not remembering the task within the allotted amount of time reflects a ProM failure (McDaniel & Einstein, 2007). The seriousness of ProM failure can easily be applied to the efficiency of everyday functioning. For example, there are consequences when one forgets to take medications or fails to turn off a stove or an electrical appliance. Therefore, ProM functioning is necessary for maintenance of functional independence. This is supported by studies that show ProM impairment is associated with performance of instrumental activities of daily living (IADLs), which are higher-order functional abilities critical to independent living and include activities such as managing medications and balancing a checkbook.

ProM tasks are commonly divided based on the type of cue that represents the appropriate moment for retrieval of an intended action, including event based (EB) cues and time based (TB) cues (Einstein & McDaniel, 1990). EB tasks involve a specific cue in the environment that triggers the retrieval of a previously formed intention (e.g. seeing a pet store reminds one that they have to stop and buy pet food). TB tasks
involve the retrieval of an intention cued by a specific time or time interval (e.g. remembering to pay bills on a certain day every month). Although TB and EB tasks require some of the same cognitive processes (e.g. forming and recalling an association between an intention and cue), it is thought that TB cues place greater demands on processes dependent on frontal lobe functioning because the cues are less distinctive and focal to attention. In regard to TB ProM, an individual must balance the performance of an ongoing task and time monitoring in order to carry out a task at the correct time. Studies investigating TB ProM measure time monitoring by the examination of the frequency and pattern that a participant checks the time on a clock that is placed behind him/her. A reduction in clock checking has been observed in individuals with poor TB ProM performance (Einstein, McDaniel, Richardson, Guynn, & Cunfer, 1995). A recent study suggests that time monitoring during TB ProM tasks may be related to frontal lobe function (McFarland & Glisky, 2009).

Although there have been a significant amount of studies that have investigated ProM functioning in aging, the available studies have revealed inconsistent findings. Einstein and McDaniel (1990) found that there were no differences in ProM in older adults and young adults. Based on their preliminary findings, they originally believed ProM to be an exception to the typical research results that yield age-related decline in memory. Some researchers show ProM abilities to be generally diminished in older adults, but there have been several clear demonstrations of equivalent performance with that of younger adults in EB ProM tasks (Einstein, Holland, McDaniell, & Guynn, 1992; Einstein & McDaniel, 1990; Einstein et al., 1995). Other studies specifically focusing on EB ProM have found significant differences between younger adults and older adults, with younger adults performing significantly better on EB ProM than older adults (Smith & Bayen, 2006, Maylor, 1996). Researchers also have examined potential differences in older adults and younger adults on TB ProM. Park, Kidder, Morrell & Mayhorn (1997), found that older adults performed significantly worse on TB tasks than young adults. Specifically, older adults had more difficulty in remembering the appropriate time when they had to do something. Age differences were less apparent in the ability to remember what was supposed to be done. It is thought that the contradictory findings of Einstein et al. (1990, 1992, 1995), Smith & Bayen (2006) and Maylor (1996) may be due to psychometric differences between the TB and EB tasks used in the studies.

In the present study, we will begin to resolve the previously described inconsistencies by focusing on ProM in older adults. Currently, no study has used a standardized measure to examine ProM in older adults. The present findings will fill this gap in the literature on aging by examining the profile of ProM impairment in aging by using the Memory for Intentions Screening Test (MIST), which is a standardized test of ProM with known psychometric properties. In addition to its psychometric properties, the MIST has many advantages over other ProM Tests, including a naturalistic measure, which tests ProM over a 24-hour delay and includes an error scoring system that allows for an examination of the component processes underlying ProM impairment. Within the MIST, a participant may not respond to a ProM cue (i.e., omission error) or they may respond to a cue at the wrong time (i.e., loss of time error), which suggests difficulty with detection of the ProM cue and/or self-initiated retrieval. In some cases, the individual is able to properly monitor and detect a target ProM cue, but may not be able to remember the contents of the action (i.e., loss of content error), which is more indicative of an impairment in retention of the ProM actions. In addition, no other study has investigated the functional consequences of ProM in aging by using instrumental activities of daily living (IADL) measures. Therefore, the first aim of this study was to examine the nature and extent of ProM impairment in aging by the use of a well-standardized measure to examine event based (EB) and time based (TB) prospective memory (ProM) in non-demented older adults. The second aim of this study was to examine the relationship between ProM impairment and performance of measures of IADLs. Thus, understanding ProM in aging may lead to interventions aimed at compensating for ProM dysfunction in order to understand and improve everyday functioning and quality of life of aging individuals. Although EB and TB tasks require some of the same cognitive processes (e.g. forming and recalling an association between an intention and cue), it is hypothesized that older adults will perform worse on TB tasks than EB tasks because it is thought that TB tasks place greater demands on processes dependent on the frontal lobe. It is also hypothesized that there will be a significant difference in the relationship between EB and TB ProM and performance on the IADLs.

Methods

Participants

As part of a larger study, a standardized ProM test (Memory for Intentions Screening Test; MIST) was administered to 26 cognitively normal
older adults (See Table 1 for demographic variables). The exclusion criteria for all participants in the study includes a history of neurological conditions, self-reported history of psychiatric disorders such as major depressive disorder or bipolar disorder, or history of substance abuse disorders. Also, any participant with a diagnosis of dementia or a score of less than 130 on the Dementia Rating Scale (DRS; Mattis, 1976), a global measure of cognitive function, was excluded from analyses. All participants were provided with an informed consent document approved by San Diego State University and the University of California, San Diego.

<table>
<thead>
<tr>
<th>Older Adult</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>69.8 ± 6.83</td>
</tr>
<tr>
<td>Gender (F/M)</td>
<td>9/17</td>
</tr>
<tr>
<td>Education</td>
<td>16.38 ± 2.43</td>
</tr>
<tr>
<td>DRS</td>
<td>140.62 ± 2.39</td>
</tr>
</tbody>
</table>

*Table 1: Mean (± standard error) demographics for participants.*

**Prospective Memory Measures**

The Memory for Intentions Screening Tests (MIST) is a standardized ProM test that consists of eight different ProM trials assigned over a 30-minute period (Raskin, 2004; see Appendix 1). While the participant was engaged in word search puzzles, which served as distractors, the ProM trials were assigned. A clock was placed on the wall behind the participant so they must turn in order to check the time on the clock during the test. Participants who wore watches were asked to remove them before the test began.

While the participant worked on the word search, 4 EB (e.g., “When I hand you a postcard, self address it”) and 4 TB (e.g., “In 15 minutes tell me it is time to take a break”) trials were given. There were also 2-minute or 15-minute delay interval tasks, verbal tasks (e.g., “In 2 minutes, ask me what time this session ends”) and physical tasks (e.g., “In 15 minutes, use that paper to write down the number of medications you are taking”). Each of the ProM trials were worth two points: one point was given for a correct response and one point was given for responding at the correct time or within 15% of the target time or to the appropriate cue (as described in Woods et al., 2008). For example, if a participant performed the wrong ProM task to an EB cue, they would receive only one point for that trial because they responded to the correct cue but the response itself was incorrect. Another example would include if a participant was 5 minutes late in

performing a ProM task, then they would receive only one point because they performed the correct response, but at an incorrect time. A score of 0 was given if the participant did not perform the ProM task during the entire test or if they gave an incorrect response at an incorrect time or to the wrong cue. Together, the cue, delay, and response modality characteristics were worth 2 points toward a total of 6 points for each of the ProM trials. Therefore, the overall summary score for the MIST ranged from 0-48 (i.e., 6 points for each of the 8 ProM trials).

After the completion of the ProM trials, the participant is administered a multiple choice recognition memory test for the content of the ProM trials (i.e., the actions that were supposed to be performed). Scores ranged from 0 to 8 and were used as a retrieval index. The retrieval index was calculated by subtracting free recall accuracy on the ProM trials (scores from 0 to 8) and then summing the difference in scores (as described in Carey et al., 2006). The retrieval index was used to measure the number of intentions that were incorrectly recalled but correctly recognized. Higher scores on the retrieval index indicated greater impairments in retrieval. There was also a 24-hour component to the MIST (scores range 0 to 2). Participants were instructed to leave a telephone message for the examiner the next day and to state the number of hours they slept the night after the assessment. This task was used as a naturalistic assessment of ProM. Patients were allowed to use any strategy they choose to remember who and when to call (e.g., saving the phone number in their telephone, setting an alarm, etc.), but were not explicitly instructed to use something to help them to remember to call.

Studies have established the psychometric properties of the MIST. There is evidence of internal consistency of the six substrates resulting in a Chronbach’s alpha of .89. The inter-rater reliability, split-half reliability, as well as inter-relationships between the MIST summary score, subscales, and error types are adequate (Woods, Moran, Dawson, Carey & Grant, 2008). The test also shows evidence of convergent validity with other measures of ProM and standardized measures of executive functioning, episodic memory, and working memory (Carey et al., 2006). The test discriminates between normal controls and individuals with amnestic mild cognitive impairment and other disorders (Karantzoulis, Troyer, & Rich, 2009). Finally, recent studies have shown that an individual’s performance on the MIST is predictive of medication non-adherence in HIV (Woods et al., 2008, 2009).
**Everyday Functioning Measures**

**Medication Adherence**

The ability to manage medications was examined using the Medication Management Ability Assessment (MMAA), a standardized performance-based measure that was originally validated in a large sample of older patients with schizophrenia (Patterson, Lacro, McKibbin, Moscona, Hughes, & Jeste, 2002). The MMMA is a role-play task where the examiner role-plays as the participant’s medical provider. The examiner “prescribed” medication while the participant played the part of the patient. The examiner read a description of the medication regimen for four mock medications. The participants were given four plastic pill bottles with labels that state the name of the medication, when they should take the medication and how often, as well as if the medication should be taken with or without food. After describing the medication regimen, there was a 1-hour delay. During this time, the pill bottles were put away and other tests in the battery were administered. After the 1-hour delay, participants were reacquainted with the pill bottles and were asked to explain their day. They were asked to tell the examiner when they woke up, when they ate their meals, and when they took their medications. As they explained their day, participants handed the examiner the number of mock pills (beans) as they would have taken them. No information was given to the participants about their medication regimen during this part of the task, but participants were allowed to check the labels as many times as they wanted to during testing. If the participant did not complete the test within 15 minutes, it was discontinued. The total number of correct responses for all of the pills (scores ranging from 0-33) was used for analyses. The MMMA showed excellent test-retest reliability (intra-class correlation coefficient = .96; Patterson et al., 2002). The MMAA also showed predictive validity, as it showed good agreement with prescription records (67%).

**Managing Finances**

The ability of individuals to manage their finances was evaluated using the Advanced Finances Test (Heaton et al., 2004), a standardized performance-based measure of financial capacity. For this test, participants were told asked to pretend they are either Dave or Diane Johnston and were handed three blank checks, a checkbook register, a check to deposit, three bills to pay, and a calculator to use if they choose to. Before beginning the test, participants were instructed to deposit the check, pay the bills, and calculate the balance on their checkbook register. Additionally, the participants were told to pay as much of the credit card bill as they could, but were to leave exactly $100 in their checking account at the end of the test. The Advanced Finances test was designed to take 10 minutes. This study implemented a 15-minute discontinue rule in order to be consistent with the MMAA. The total score on this measure ranged from 0 to 13 points. The Advanced Finances Test was modified in this study to include a semi-naturalistic ProM test; at the conclusion of the test, the participant was asked to “mail the bills” in an outbox at the end of the testing session. While the remaining tests were administered, the bills were kept on the side of the table in an envelope until the examiner gave the appropriate cue: “The testing session is now over” at the end of the testing session. The semi-naturalistic ProM trial was worth two points: one point for responding at the end of the testing session and one point for actually mailing the bills by setting them in the outbox. Prior studies support the reliability (internal consistency; Chronbach’s alpha = .82) and discriminative validity (neuropsychologically impaired HIV patients showed worse performance compared to HIV patients with normal neuropsychological functioning) of the Advanced Finances Test.

**Statistical Analysis**

The data from the MIST were analyzed using a within group, one-way analysis of variance test (ANOVA). As shown in Figure 1, analyses revealed no significant within group differences between EB ProM (M = 6.23) and TB ProM (M = 6.54), F (1, 25) = 1.56, p = .22. A Pearson r correlation was used to compare EB and TB ProM with the data from the naturalistic 24-hour delay measure on the MIST. It was found that TB ProM did not significantly correlate with the naturalistic measure on the MIST, (r = .31, p > .05). Similarly, EB ProM did not significantly correlate with the naturalistic measure on the MIST (r = .25 , p > .05). Using Pearson r correlations, it was found that TB ProM significantly correlated with the Advanced Finances test, (r = .54 , p < .01); however, a significant correlation was not detected between EB ProM and the Advanced Finances test (r = .35, p = .08). It also was found that EB ProM significantly correlated with the MMAA test (r = 518, p = .01); however, a significant correlation was not detected between TB ProM and the MMAA test (r = .111, p = .59).

**Discussion**

As shown in Figure 1, the present findings have revealed no significant within group differences between EB and TB ProM performance in older adults. Contrary to the first hypothesis, EB
and TB ProM did not significantly differ in older adults on the MIST. Perhaps these findings are due to the MIST not being able to differentiate between EB and TB ProM tasks or the tasks themselves not being difficult enough. The older adults performed very well on the MIST, so another explanation could be that there really is no significant difference between EB and TB ProM in this population. The naturalistic measure on the MIST did not significantly correlate with performance on either the EB or TB ProM tasks. There are a few possible hypotheses for this finding. First, the 24-hour delay measure is a “semi-naturalistic item” intended to test everyday functioning and test the cognitive load on working memory during instruction. Perhaps the naturalistic measure is too easy for the participants and did not adequately test their ability to “remember to remember.” Second, the older adults may have used compensatory strategies after they left the testing session. During testing, participants were allowed to write down what was required of them and the phone number to call, but were not specifically instructed to do so. Once they left the testing sight, it is possible they wrote down the information in a daily planner, set an alarm or told their significant other about the task to ensure they would remember to call.

In support of the second hypothesis, the IADL measures were differently related to performance on EB and TB ProM tasks. These findings revealed that TB ProM correlated with the Advanced Finances test, but not the MMAA test. This could be due to the fact that finances require an individual to pay closer attention to the time of year, month or day that a bill must be paid to be considered on time and is not necessarily cued by a specific event. EB ProM correlated with the MMAA test but not the Advanced Finances test. Perhaps this relationship exists because taking medications is often associated with events such as eating meals (e.g., take two pills before dinner or take one pill with lunch). This differentiation between EB and TB ProM tasks suggest that there is a difference in the cognitive processes needed to carry out certain everyday activities. This supports findings demonstrating that although EB and TB tasks require many of the same cognitive functions, they are likely separate and distinct processes.

This study adds to the literature by demonstrating that EB and TB ProM does not differ in healthy older adults utilizing a standardized ProM measure (MIST) with known psychometric properties. By using a standardized ProM measure, the relationship between EB and TB ProM tasks is more generalizable and has minimized potential concerns about validity related to past studies that have not used a standardized measure of ProM. The benefits of having the results of a standardized measure of ProM are vast. This research is important for researchers studying ProM deficits associated with aging. In addition, the results from a well-validated measure of ProM are useful for studies investigating ProM impairment associated with neurodegenerative disease. The findings could be used as a control comparison for studies concentrating on Alzheimer’s Disease, Parkinson’s Disease, Mild Cognitive Impairment and other dementia disorders. Additionally, the present data can be used to examine age-related differences between older adults and young adults. In fact, the MIST is currently being used to determine the relationship between EB and TB ProM in younger adults in an attempt to answer the pending question left by other studies regarding differences between young adults and older adults in ProM (Einstein et al., 1992; Einstein & McDaniel, 1990; Einstein at al., 1995, Smith & Bayen, 2006, and Maylor, 1996). Future studies should extend the IADL measures to young adults to better determine ProM abilities and potential differences between young adults and older adults by using a naturalistic measure and how ProM relates to IADLs. This research also could be used to explore the potential cognitive differences between the present 65 and older population and the upcoming Baby Boomer population, who is at an increased risk for neurodegenerative disorders. The study also could lead to the development and implementation of interventions aimed at teaching compensatory cognitive strategies for ProM dysfunction to improve everyday functioning and quality of life older adults.

This study may have implications for formal assessment of ProM during clinical evaluations of neuropsychological function. In a recent study (Fish, Wilson & Manly, 2010) noted that many tests have not been used on clinical populations, but have been assessed with “real” actions performed in the testing room. For example, the 24-hour delay naturalistic item used in the MIST calls into question the ability to generate much of a range of performance on the task. Participants either get the points or they do not; there is no range in points. This concern is valid, as shown in the present study that there were no differences in the relationship between the EB and TB ProM tasks and the naturalistic ProM measure. These findings may lead to a new line of investigation in the scientific community, which is to discover how the information received from testing individuals can be best used to actually predict individuals’ performance in everyday life.
Fish et al. (2010) also question the use of naturalistic ProM measures to determine everyday functioning in the following ways: 1) The naturalistic setting may be viewed as intrusive to the participants 2) it is not possible to establish how valid the participant’s reasons are for missing ProM tasks and 3) the differentiation in the daily lives of individuals could significantly affect the ability to establish a normative basis to determine individual performance.

The present study faced some significant limitations. The first limitation was the small sample size. Future studies should attempt to increase not only the number of individuals being tested, but broaden the level of the participants’ education, their ethnicity and the region in which they are living to increase the generalizability of the findings. Given an increased sample size, it is possible to better map the cognitive decline in certain age groups (i.e. individuals aged 60-70, 70-80).

While there are many remaining questions, research in this area of study has clear benefits for both researchers and the individuals with whom they are working. Since the population of individuals 65 and older is growing everyday, there is a significant need for continued research in this area. The potential upcoming epidemic of neurodegenerative disorders in the Baby Boomer population has resulted in an unprecedented need for neurological testing and assessment, especially in the realm of Prospective Memory.

References

Figure 1: Mean (± standard error) raw scores of time-based and event-based ProM in normally aging older adults


## Appendix

### Appendix 1: The Memory for Intentions Screening Test (MIST)

<table>
<thead>
<tr>
<th>Order of Presentation</th>
<th>Instructions</th>
<th>Cue</th>
<th>Response Modality</th>
<th>Time Delay (Minutes)</th>
<th>Order of Execution</th>
<th>Cognitive Load</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>“In 15 minutes, tell me it is time to take a break.”</td>
<td>Time</td>
<td>Verbal</td>
<td>15</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Recognition foils: “At any point during this test, were you supposed to:</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Tell the examiner to turn off the lights? Tell the examiner to leave the</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>room?”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>“When I show you a red pen, sign your name on your paper.”</td>
<td>Event</td>
<td>Action</td>
<td>15</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Recognition foils: “When the examiner gave you a red pen, were you</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>supposed to: Write your date of birth? Take it home with you?”</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>“In 2 minutes, ask me what time this session ends today.”</td>
<td>Time</td>
<td>Verbal</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Recognition foils: “At any point during this test, were you supposed to:</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Ask what time the office closes? Ask for your medical records?”</td>
<td></td>
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</tr>
<tr>
<td>4</td>
<td>“When I show you a postcard, self-address it.”</td>
<td>Event</td>
<td>Action</td>
<td>15</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Recognition foils: “When you were handed a postcard, were you supposed to:</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Write today’s date? Write a note to the examiner?”</td>
<td></td>
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</tr>
<tr>
<td>5</td>
<td>“When I show you a Request for Records form, write your doctors’ names on</td>
<td>Event</td>
<td>Action</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>it.”</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Recognition foils: “When the examiner handed you a Request for Records</td>
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<td></td>
<td>form, were you supposed to: Write your phone number? Fold the form?”</td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>“In 15 minutes, use that paper [examiner points to word search puzzle] to</td>
<td>Time</td>
<td>Action</td>
<td>15</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>write the number of medications you are currently taking.”</td>
<td></td>
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<td>Recognition foils: “At any point during this test, were you supposed to:</td>
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<td></td>
<td>Write a list of your past hospitalizations? Write the number of children in</td>
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<td></td>
<td>your family?”</td>
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<tr>
<td>7</td>
<td>“When I show you the tape recorder, tell me to rewind the tape.”</td>
<td>Event</td>
<td>Verbal</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Recognition foils: “When the examiner showed you a tape recorder, were you</td>
<td></td>
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<td></td>
<td>supposed to: Press the stop button? Tell the examiner to check the battery</td>
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<tr>
<td>8</td>
<td>“In 2 minutes, please tell me two things you forgot to do this past week.”</td>
<td>Time</td>
<td>Verbal</td>
<td>2</td>
<td>7</td>
<td>2</td>
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<td>Recognition foils: “At any point during this test, were you supposed to:</td>
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<tr>
<td></td>
<td>Tell the examiner 2 grocery items? Tell the examiner 2 things you have to</td>
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<td></td>
<td>do tonight?”</td>
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Validation of a Spanish Version of a Test Assessing Functional Capacity: UCSD Performance-based Skills Assessment (UPSA)

Denisse Tiznado

Abstract

Background: Functional capacity has been the focus of clinical care and many research studies specifically its assessment. The UCSD Performance-based Skills Assessment (UPSA) may currently be the most reliable and valid measure of functional capacity, however there is a lack of normative and psychometric data on monolingual Hispanics. Previous research has found that Spanish-speaking Mexican-Americans diagnosed with schizophrenia performed significantly lower than Anglo-Americans, however there is no evidence suggesting that Hispanics function poorer than other population groups. This difference could be the result of non-culturally sensitive measures or a need to establish separate cut-points for different populations. The present investigation was designed to establish normative data and initial validity for the Spanish-version of the UPSA. Method: Participants included 29 Latino participants (Mean age=46.99, SD=9.1) with a schizophrenia or schizoaffective disorder and 21 healthy controls (Mean age= 45, SD=8.28). Functional capacity was measured using the UCSD Performance-based Skills Assessment (UPSA). Acculturation was measured using the Acculturation Rating Scale for Mexican Americans (ARSMA). All assessments were conducted in Spanish by a bilingual and bicultural research assistant. Results: Independent T-tests indicated that participants with a diagnosis of schizophrenia scored significantly lower on the UPSA sub-scales and total score except for the transportation sub-scale. A hierarchical multiple regression also indicated that the overall model, including age, gender, and acculturation as covariates and education as the predictor, was statistically significant, $R^2 = .49, F (4, 24) = 5.77, p = .007$, in predicting total UPSA scores on patients with schizophrenia. Discussion: Total UPSA scores and the sub-scales, except for transportation, do discriminate between the schizophrenia and healthy control group and patients performance on UPSA total scores was significantly predicted by years of education, when controlling for acculturation and demographic variables. The normative data on Hispanics can now be used when understanding Hispanic UPSA scores, instead of incorrectly using English-speaking norms. Key Words: Latinos, Spanish performance-based tests, schizophrenia and schizoaffective disorder, functional capacity.

Acknowledgements: This research was supported by the following research grants from the National Institute of Mental Health (NIMH): NIMH-COR Grant MH-65183 and Grant NIMH R01MH084967.

INTRODUCTION

What is Schizophrenia?

Schizophrenia is a medical condition that affects about one percent of the world’s population. Symptoms of the disease include various combinations and severities of positive, negative and disorganized symptoms. Positive symptoms include the presence of hallucinations and/or delusions, such as hearing voices or seeing things that others cannot hear or see and/or having false beliefs or misconceptions of certain events. Negative symptoms consist of the absence of or restriction to emotion and/or volition (e.g., affective flattening, alogia, and/or avolition) and disorganized symptoms (e.g., disorganized speech, grossly disorganized or catatonic behavior). According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR, 2000), the diagnostic criteria for schizophrenia include at least two of the following symptoms during a 1-month period: delusions, hallucinations, disorganized speech, grossly disorganized or catatonic behavior, or negative symptoms (i.e., affective flattening, alogia, or avolition). Only the presence of one of these symptoms is required if the
delusions are bizarre or the hallucinations consist of two or more voices conversing with each other, or the voices continue providing commentary on the individual's behavior or thoughts.

Schizophrenia typically develops in young adulthood with men having earlier onset than women, however there are no prevalent differences between men and women (McGrath, Saha, Chant, & Welham, 2008; S. Saha, Chant, Welham, & McGrath, 2005). Past research has shown that the likelihood that someone will develop schizophrenia is approximately seven individuals in one thousand (McGrath, et al., 2008). The risk for mortality in those with schizophrenia is significantly higher than the general population (Sukanta Saha, Chant, & McGrath, 2007), and the mortality risk is highly attributable to multiple diseases (e.g. cardiovascular diseases) (McGrath, et al., 2008).

Impact of Schizophrenia on Quality of Life

Although schizophrenia only affects about one percent of the population, it is the fourteenth leading cause of disability worldwide (World Health Organization, 2008). Furthermore, schizophrenia is one of the most chronic disorders, ranking fifth among all diseases in the world in terms of years lost to disability (World Health Organization, 2008).

The overall cost of schizophrenia in the U.S. in 2002 was estimated to be $62.7 billion, likely due to drastic changes in the individual’s level of social functioning. For example, Meesters and colleagues (2010) reported changes in functioning in the areas of employment, marriage, social contact, and independent living. Approximately only 10% to 15% of people who have schizophrenia maintain full-time employment (Wu, et al., 2005). Relative to the general population, many individuals with schizophrenia do not live independently in the community, instead residing disproportionately in supported housing such as Board and Care (B&C) or skilled nursing facilities (SN). Also, past research has found decreased marital and fertility rates in patients with schizophrenia relative to the general population, especially in men (Hutchinson, et al., 1999; Nanko & Moridaira, 1993). In addition to global social targets such as employment, educational attainment, and marriage, schizophrenia affects an individual’s ability to perform everyday functional tasks (e.g. use transportation, shop, make change and pay bills), which also result in reduced quality of life and higher treatment costs (Wu, et al., 2005). For example, a number of factors associated with schizophrenia have been proposed as contributors to poor social functioning. These include positive symptoms (Angell & Test, 2002), negative symptoms (Slade & Salkever, 2001), and depressive symptoms (Christopher R. Bowie, et al., 2008). Clinical symptoms are the most targeted among clinicians; yet, one study demonstrated that a 40% reduction in clinical symptoms would result in only an 8% improvement in employment rates among patients with schizophrenia (Meesters, et al., 2010). Thus, other factors likely contribute greater variance in predicting social functioning. In a study conducted by Bowie et al. (2006) neuropsychological performance was found to be associated with functional capacity, suggesting that neurocognitive deficits may contribute to poor functioning through their impact on functional capacity. Specifically, verbal memory and executive functioning predicted functional capacity and processing speed predicted real world behaviors and social skills (Christopher R. Bowie, et al., 2008). Functional capacity and its predictors have been the focus of clinical care and many research studies. A particular area of interest has been on the various methods of measuring patients’ functional capacity in the real-world such as clinician and caregiver reports, patients’ self-reports, direct observation and performance based measures.

Measuring Functional Ability in Schizophrenia

There are many different methods by which functioning has been measured. In a recent review, Patterson and Mausbach (2010) describe these methods in detail, and these methods are summarized below. Clinicians can provide more reliable information regarding patients functioning levels, but a drawback to clinicians’ ratings is the limited range of behaviors that they can report.

Patient’s self-report is easy to administer, cost-effective and not likely do not require specialized training to administer and/or score. Self-reports also provide insight about the patient’s perspective on important issues (Wilkinson, et al., 2000). However, the validity of self-report measures can be threatened when administered to severely mentally ill individuals because scores could be influenced by psychopathology, poor insight, life events and cognitive deficits (Atkinson, Zibin, & Chuang, 1997).

Caregiver report of the patient functioning could increase the reliability of patients’ self-report (Mckibbin, Brekke, Sires, Jeste, & Patterson, 2004) but as stated by Patterson and colleagues (1996) finding caregivers that could rate patients in their everyday functioning could be very difficult. Moreover, caregivers report could also be affected by their own levels of functioning (Mckibbin, et al., 2004).
Direct observations in naturalistic settings require observers to wait for the target behavior to occur making this method very time consuming. Also, participants who know that are being observed might behave differently from how they will normally behave in that same situation.

Performance based measures provide insight into participants real-world functioning prompting them to perform everyday tasks in control settings that mimic real world situations. (T. L. Patterson & Mausbach, 2010). Although performance based measures reflect participant functioning, control settings do not take in to account environmental factors that may be attributing to functioning.

Among all these different possibilities of assessing functioning, performance based measures have been found to be more reliable and valid (T. L. Patterson & Mausbach, 2010). While the search for a gold standard of measuring functional capacity in schizophrenia is ongoing, recent data suggest that the UCSD Performance-Based Skills Assessment (UPSA) (Thomas L. Patterson, Goldman, McKibbin, Hughes, & Jeste, 2001) may currently be the most reliable and valid measure of functional capacity among people diagnosed with schizophrenia or schizoaffective disorder (Harvey, Velligan, & Bellack, 2007). A study conducted by Harvey, Velligan and Bellack (2007) assessed the reliability of different performance-based measures and found very high test-retest and interrater reliability data for the UPSA. The UPSA has also been found to correlate with theoretically similar constructs such as cognitive performance (Christopher R. Bowie, et al., 2008; C. R. Bowie, Reichenberg, Patterson, Heaton, & Harvey, 2006; Green, et al., 2008) suggesting good convergent validity. Mausbach et al. (2008a) demonstrated good criterion validity by predicting living status in a large sample of patients diagnosed with schizophrenia or schizoaffective disorder. Although many different studies have found the UPSA to be a reliable and valid measure of functional capacity, to date, there are no normative data and little is known about its reliability and validity on its use with monolingual Hispanics.

Previous research has demonstrated that Mexican-Americans with a diagnosis of schizophrenia who preferred to be tested in Spanish on the UPSA performed significantly lower than Anglo-Americans (Jeste, et al., 2005). Also, Patterson et al. (2005) found similar results when comparing Latino patients’ UPSA scores and Caucasian UPSA scores. Latino patients scored significantly lower over and above age and severity of illness. In spite of the data suggesting that Hispanics score lower on the UPSA, there is no evidence to suggest that Hispanics function poorer than other population groups. This difference could be the result of non-culturally sensitive measures. Distinct procedures could be used to increase the cultural sensitivity in performance-based measures, such as revising the UPSA, re-norming to Hispanic, or developing new tests that are not as sensitive to ethnicity. Interestingly, no normative data has been collected on Spanish-speaking healthy controls that reside on their own and have independence in their lives, even after a series of studies have used the Spanish UPSA to measure functional capacity in this population.

The purpose of the present study was to establish normative data and determine the validity for the Spanish-language version of the UCSD Performance-Based Skills Assessment (UPSA) for use with severely mentally ill Hispanic patients. It was hypothesized that participants with severe mental illnesses (i.e., schizophrenia, schizoaffective disorder) would perform significantly lower on the UPSA relative to subjects without a severe mental illness (i.e., “Hispanic normal controls”). It was also hypothesized that scores on the UPSA were associated with employment status (e.g., employed vs. not employed) and residential independence (i.e., head of household vs. not head of household).

METHODS

Participants

Thirty-one people diagnosed with a DSM-IV based chart diagnosis of schizophrenia or schizoaffective disorder and 21 healthy controls participated in this study. Exclusion criteria for patients diagnosed with schizophrenia were a diagnosis of dementia, high suicide risk, and/or participation in a psychosocial treatment, and an exclusion criterion for healthy controls was any diagnosis of a psychiatric illness. Participants identified as Latinos and the majority were of Mexican descent. Participants had to be monolingual Spanish-speakers or preferred to be tested in Spanish to participate in this study. Participants with a diagnosis of schizophrenia were recruited from three mental health clinics located near the U.S. Mexican border in San Diego County and were part of a pilot test for a psychosocial intervention for older Latinos with schizophrenia entitled Programa de Entrenamiento para el Desarrollo de Aptitudes para Latinos (PEDAL) (T. L. Patterson, et al., 2005). All data from patients diagnosed with schizophrenia were from the baseline assessment of the PEDAL study. Healthy controls were recruited from churches, community meetings, parent and teacher meetings at an elementary school and onsite referrals. Participants
were offered a $20 incentive and all participants signed written informed consent forms in their primary language. The UCSD Institutional Review Board approved this study.

Assessments were conducted in Spanish by a bilingual and bicultural research assistant and all measures were administered in Spanish. The translation of the UPSA involved a series of steps. Step one involved translating the measure to Spanish and then back-translating by two different staff members who identified as having Mexican descent. Step two involved reviewing words or phrases that were problematic by a 4-person committee. Step 3 involved comparing the Spanish and the English versions of the UPSA. The last step involved a review of the UPSA by three staff members (1 Ph.D. and 2 master’s level) of Mexican origin.

Measures

Functional Capacity. Functional capacity was measured using the Spanish-language version of the UCSD Performance Based Skills Assessment (UPSA). The UPSA assesses patients’ ability to perform a variety of everyday living tasks including: Comprehension/Planning; Finance; Social/Communications; Transportation; and Household Chores.

The planning and organization domain asked participants to read two stories; one illustrates a trip to the beach on a sunny and warm day, and the second a trip to the zoo on a rainy day. They were then asked to recall important information and to give five examples of objects they should take to the beach (e.g., sunscreen, swimsuit, sandals, towel, sunglasses, etc.) and five examples of objects they should take to the zoo (e.g., umbrella, comfortable shoes, lunch, rain coat, money, etc.). This subset takes approximately eight minutes to complete.

In the communication domain participants are provided with a disconnected telephone and are asked to dial the number they will call if they had an emergency (correct response is 9-1-1). An additional task was to call information, ask for a number and dial the number from memory. The final task asked participants to read a letter they received from their doctor and were also asked to call the hospital to reschedule their appointment. Participants were score on the quality of their message. In addition, participants were also asked to recall how they had to prepare for their medical appointment (e.g., fast for a blood draw) and what two items they had to take to their appointment (e.g., insurance card and list of medications). This subset takes approximately five minutes to complete.

In the transportation domain participants are provided with three bus schedules from the San Diego Transit District and are asked about the cost of the bus ticket, the telephone number they could dial to obtain more information on bus schedules, and to point to the different trolley stations. They were also asked to point to the correct bus schedule to get to a particular location and where they would get off the bus to transfer to a different bus. These tasks take around five minutes to complete.

The financial management domain provided participants with simulated bills and real coins. The first task asked participants to count specific amounts (e.g., $12.17, $6.73, $1.02) and to make change from ten dollars. The second part of this domain is to write out a check to pay a utility bill. Participants were given a real utility bill from San Diego Gas and Electric (SDG&E) and were asked to write a complete check (e.g., check is written to SDG&E, the total amount corresponds to the amount in the bill, the account number is written in the memo section, etc.). Participants were scored based on the completion and accurateness of the information they wrote on their check. This subset takes about eight minutes to complete.

The household management domain provided participants with a recipe of rice pudding and with an incomplete shopping list. Participants were then presented with 29 items that can be found in their pantry (e.g., potato chips, rice, crackers, jelly, toothpaste, etc.) and were asked to write a shopping list based on the missing and necessary items they need to buy to cook rice pudding. This task takes about five minutes to complete.

Administration of the UPSA requires an average of 30 minutes to complete. Participants receive scores for each of the 5 subscales (range = 0-20), which are summed to create a summary score ranging from 0 to 100.

Acculturation. Acculturation was measured using the Acculturation Rating Scale for Mexican-Americans (ARMSA) a 20 item questionnaire. This instrument assesses different variables of acculturation such as, language use and preference, ethnic identification, cultural heritage and upbringing information. The scale uses a 5 point Likert-type scale ranging from 1 (low level of acculturation) to 5 (high levels of acculturation) with higher scores representing higher levels of acculturation.

Data Analysis

T-tests were conducted to compare differences between healthy controls and patients diagnosed with schizophrenia on continuous variables (e.g. UPSA total scores and UPSA sub-
scales). Categorical variables were analyzed using Pearson’s chi-squares tests (e.g. Marital status and gender). Pearson correlations were conducted to analyze the relationship between variables of interest (Acculturation, education and UPSA total and sub-total scores). A hierarchical multiple regression was performed to assess whether education predicted the total UPSA score in patients diagnosed with schizophrenia when controlling for age, gender, and acculturation.

RESULTS

Characteristics of the sample.
Comparisons of group (schizophrenia vs. healthy controls) demographics revealed no significant differences on variables such as gender, age, education and living status, suggesting no individual differences between our groups. However, there were significant differences between marital ($\chi^2 (1, N=50) = 20.69, p < .001$) and employment status ($\chi^2 (1, N=50) = 15.25, p < .001$) (table 1).

Comparison of patients with schizophrenia and healthy controls on UPSA performance. Mean scores of people diagnosed with schizophrenia and healthy controls were compared on UPSA total scores and sub-scales (table 2). Participants diagnosed with schizophrenia performed significantly lower on UPSA total scores ($t (48) = 5.26, p < .001$) and the sub-scales of household chores ($t (48) = 5.72, p < .001$), communication ($t (48) = 2.57, p = .013$), finance ($t (48) = 6.32, p < .001$) and planning and organization ($t (48) = 4.36, p < .001$). The only sub-scale that was not significantly different between the two groups was transportation.

Correlations between UPSA total scores, education and acculturation. A positive significant correlation was found between UPSA total scores and education ($r (27) = .62, p < .001$), and acculturation ($r (27) = .55, p = .002$). A significant positive correlation was also found between acculturation and education ($r (27) = .52, p = .004$) (table 3).

Predicting total UPSA scores in patients diagnosed with schizophrenia. A hierarchical multiple regression was performed to assess the contribution of total years of education when controlling for age, gender and acculturation on total UPSA scores in people diagnosed with schizophrenia. Gender and age were entered in step 1, acculturation was entered in step 2 and finally education was entered in step 3. None of the variables on step 1 were significant predictors. In step two, acculturation was a significant predictor ($t (27) = 3.34, p = .003, R^2 = .31$) when controlling for age and gender, accounting for 31% of the variance in UPSA total scores. Interestingly in step 3, acculturation was not a significant predictor but education was ($t (27) = 2.93, p = .007$). The overall regression, including age, gender, acculturation and education, was statistically significant, $R^2 = .49, F (4, 24) = 5.77, p = .007$. Results of this regression are summarized in Table 4.

DISCUSSION

In a country where the Latino population is rapidly increasing, it is essential to translate, validate and collect normative data on important measures. Real-world functioning has been a variable of interest to clinicians and researchers in the schizophrenia population, therefore it is important to have reliable and valid measures of functioning. This study provides normative data and initial validity for the Spanish-version of the UCSD Performance-based Skills Assessment (UPSA). Consistent with our hypothesis, patients with schizophrenia performed significantly lower than healthy controls on the UPSA total scores and the subscales of household chores, communication, finances, and planning and organization. Interestingly, both patients with schizophrenia and healthy controls performed poorly on the transportation subscale, suggesting that the subscale is culturally biased toward the Spanish-speaking population. A possible explanation could be that in general participants who preferred to speak Spanish and identify with a Mexican background, are not familiar with bus schedules and therefore have a hard time understanding the map. Although the bus maps that were provided to participants do have a Spanish translation, it is still hard to understand the format of the map. Therefore, caution should be used when using this subscale with a low acculturated Mexican-American population.

Relationships between the UPSA, education and acculturation were also found in the schizophrenia group. Participants who reported being more acculturated performed significantly higher on the UPSA total scores. Also, the more years of school a participant reported, the higher their UPSA total scores. Patients with schizophrenia performance on the UPSA total scores were significantly predicted by years of education, when controlling levels of acculturation and demographic variables. Therefore, it is
### Demographic Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Schizophrenia (n=29)</th>
<th>Healthy Control (n=21)</th>
<th>$t$</th>
<th>$\chi^2$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs), mean (SD)</td>
<td>49.66 (9.1)</td>
<td>45 (8.28)</td>
<td>-1.86</td>
<td></td>
<td>0.069</td>
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<tr>
<td>Education (yrs), mean (SD)</td>
<td>8.38 (3.28)</td>
<td>10.00 (3.07)</td>
<td>1.77</td>
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<td>0.083</td>
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<tr>
<td>Gender</td>
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<tr>
<td>Male, n (%)</td>
<td>15 (51.7%)</td>
<td>8 (38.1%)</td>
<td>.51</td>
<td></td>
<td>0.474</td>
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<tr>
<td>Female, n (%)</td>
<td>14 (48.3%)</td>
<td>13 (61.9%)</td>
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<tr>
<td>Living Situation</td>
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<td>3.15</td>
<td>0.369</td>
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<tr>
<td>Alone, n (%)</td>
<td>3 (10.3%)</td>
<td>0 (0.0%)</td>
<td></td>
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<tr>
<td>With someone, n (%)</td>
<td>25 (86.2%)</td>
<td>21 (100%)</td>
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<tr>
<td>Assisted Care Facility, n (%)</td>
<td>1 (3.4%)</td>
<td>0 (0.0%)</td>
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<tr>
<td>Marital Status</td>
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<td>20.69</td>
<td>&lt;0.001</td>
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<tr>
<td>Single, n (%)</td>
<td>13 (44.8%)</td>
<td>0 (0.0%)</td>
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<tr>
<td>Married/Cohabitating, n (%)</td>
<td>7 (24.1%)</td>
<td>18 (85.7%)</td>
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<tr>
<td>Divorced/Separated, n (%)</td>
<td>8 (27.6%)</td>
<td>2 (9.5%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Widowed, n (%)</td>
<td>1 (3.4%)</td>
<td>1 (4.8%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment Status</td>
<td></td>
<td></td>
<td></td>
<td>15.25</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Employed, n (%)</td>
<td>2 (14.3%)</td>
<td>12 (85.7%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not employed, n (%)</td>
<td>27 (93.1%)</td>
<td>9 (42.9%)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

important to consider patients education and acculturation levels when interpreting their scores.

Normative data on Hispanics can now be used when understanding Hispanic UPSA scores. Past research has found that participants who preferred to take the UPSA test in Spanish scored significantly lower than healthy controls (Jeste, et al., 2005; T. L. Patterson, et al., 2005), but these comparisons where made without understanding how Hispanic healthy controls performed on the test. This issue could lead to potential problems when interpreting Hispanic UPSA scores because they could be perceived as functioning poorer than English-speaking participants. Brent and colleagues ((Mausbach, et al., 2008) suggested that a cutoff score of 75 on the UPSA predicted living independently in patients with schizophrenia who identified English as their preferred language. This is problematic in the Spanish-speaking population when we consider that the mean total UPSA score for healthy controls was 72.

Since functional capacity is an important target of intervention and rehabilitation programs, efforts have been made to create and test valid and reliable measures of real-world functioning (compared to self-report) that can be used with the Hispanic population. This study has presented normative data on a performance-based measure that has been found to be reliable and valid with the English population.

This study has limitations that are important to mention. The sample size of both the patients with schizophrenia and the healthy control groups are small, but the researchers are currently in the process of increasing their sample size by collecting more data. There are also interrelated variables in our analysis, education and acculturation are significantly related to each other, and that could potentially be a problem when interpreting the predictive value of education on performance on the UPSA. Past research has established predictive validity for the English-version of the UPSA (Mausbach, et al., 2008), but this data cannot be generalized to the Hispanic population. Future research should assess the predictive validity of the Spanish-version of the UPSA. Also, future studies should compare the healthy controls and the patients with schizophrenia in both Spanish and English speaking groups to assess the differences between the four groups and better understand the cultural sensitivity of the UPSA.

The understanding of established reliable and valid tests of functional capacity in its use with
Table 2. Comparison of Schizophrenia patients and Healthy controls on UPSA performance.

<table>
<thead>
<tr>
<th>UPSA Subscales</th>
<th>Schizophrenia mean (SD) n = 29</th>
<th>Healthy Control mean (SD) n = 21</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household Chores</td>
<td>6.90 (5.89)</td>
<td>15.24 (3.70)</td>
<td>5.72</td>
<td>0.001</td>
</tr>
<tr>
<td>Communication</td>
<td>6.36 (5.20)</td>
<td>9.95 (3.37)</td>
<td>2.57</td>
<td>0.013</td>
</tr>
<tr>
<td>Finance</td>
<td>8.21 (5.09)</td>
<td>15.84 (2.52)</td>
<td>6.324</td>
<td>0.001</td>
</tr>
<tr>
<td>Transportation</td>
<td>11.38 (6.08)</td>
<td>13.81 (5.40)</td>
<td>1.46</td>
<td>0.151</td>
</tr>
<tr>
<td>Planning and Organization</td>
<td>13.56 (4.03)</td>
<td>17.57 (1.39)</td>
<td>4.359</td>
<td>0.001</td>
</tr>
<tr>
<td>UPSA Total Scores</td>
<td>46.41 (20.77)</td>
<td>72.41 (10.51)</td>
<td>5.26</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Table 3. Predicting UPSA total scores in a Spanish speaking schizophrenia population.

<table>
<thead>
<tr>
<th>Predictor</th>
<th>b</th>
<th>β</th>
<th>t</th>
<th>R²</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>0.034</td>
<td>0.015</td>
<td>0.074</td>
<td>0.000</td>
<td>2.26</td>
<td>0.941</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.187</td>
<td>-0.005</td>
<td>-0.023</td>
<td></td>
<td></td>
<td>0.982</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>0.155</td>
<td>0.068</td>
<td>0.392</td>
<td></td>
<td></td>
<td>0.699</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.865</td>
<td>-0.021</td>
<td>-0.123</td>
<td></td>
<td></td>
<td>0.903</td>
</tr>
<tr>
<td>Acculturation*</td>
<td>1.079</td>
<td>0.558</td>
<td>3.339</td>
<td>0.309</td>
<td>3.25</td>
<td>0.003</td>
</tr>
<tr>
<td>Step 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>0.171</td>
<td>0.075</td>
<td>0.492</td>
<td></td>
<td></td>
<td>0.627</td>
</tr>
<tr>
<td>Gender</td>
<td>-7.014</td>
<td>-0.172</td>
<td>-1.075</td>
<td></td>
<td></td>
<td>0.293</td>
</tr>
<tr>
<td>Education (yrs)*</td>
<td>0.560</td>
<td>0.290</td>
<td>1.676</td>
<td></td>
<td></td>
<td>0.107</td>
</tr>
<tr>
<td></td>
<td>3.365</td>
<td>0.531</td>
<td>2.926</td>
<td>0.490</td>
<td>4.24</td>
<td>0.007</td>
</tr>
</tbody>
</table>

Monolingual Hispanic population is a needed area of research. The establishment of normative data has the potential to advance our understanding of the importance of considering patients’ backgrounds when assessing and interpreting their scores related to functional capacity.

Table 4. Correlations between UPSA total scores, acculturation and education

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPSA Total-Scores</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acculturation</td>
<td>0.55*</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>0.62*</td>
<td>0.52*</td>
<td>--</td>
</tr>
</tbody>
</table>

*p < .005 (2-tailed)

REFERENCES


Negative Emotions and Health Behaviors among Mexican-American Women: Does Language Matter?

M. Alicia Núñez

Abstract

Unhealthy lifestyle behaviors pose a serious public health concern, particularly among minority populations. Few studies have examined the associations of negative emotions and acculturation with health behaviors in Mexican-American women. The objective of this study was to examine the roles of acculturation, and negative emotions (i.e., depression, anxiety) in health behaviors (i.e., physical activity, dietary and sleep patterns) among middle-aged Mexican-American women. Data from Nuestra Salud (i.e., “Our Health”), an observational epidemiological study were utilized. Participants included 321 Mexican-American women 40-65 years of age who completed a questionnaire assessing negative emotions and health behavior practices. Both depression and anxiety were found to be negatively associated with dietary choices, such that higher anxiety scores were related to poorer diet ($p < .05$). Depression was found to be associated with increased sedentary behavior ($p < .05$). Overall, acculturation negatively influenced health behaviors. Results suggest that depression and anxiety relate to adverse behavioral health risk profiles. Findings also highlight the need to address negative emotions in relation to adherence to healthy lifestyle recommendations.

Healthy People 2020 (U.S. Department of Health & Human Services [USDHHS]) has identified mental health and lifestyle practices as leading health indicators in the United States (U.S.). Health behaviors are acknowledged as major modifiable determinants of cardiovascular disease (CVD) and other chronic illnesses (Centers for Disease Control and Prevention [CDC], 2010; Hunter, Goodie, Oordt, & Dobmeyer, 2009). Some of the health-damaging behaviors that have been identified include physical inactivity, poor diet, poor sleep quality, overweight, and obesity. Data from national studies show that the general U.S. population has alarming non-optimal levels of health behavior practices (CDC, 2010). It has been suggested that this trend may in fact be higher for women than men, particularly in regards to physical activity (CDC, 1996).

Sedentary lifestyle, poor diet, and being overweight pose a serious public health concern, particularly among minority populations (USDHHS, 2010; Lakka & Bouchard, 2005). Latinos are the largest and fastest growing ethnic minority population in the U.S., with Mexican-Americans constituting the largest Latino subgroup (Passel, 2011). Ethnic minorities, including Mexican-Americans have been found to display higher lifestyle CVD risk factors than non-minority populations (USDHHS, 2010). For instance, Mexican-American women display lower physical activity levels and higher obesity rates compared with White women (Crespo, Smit, Andersen, Carter-Pokras, & Ainsworth, 2010; Eyler et al., 2004).

Research suggests that sociodemographic factors alone (e.g., age, income, education) do not explain disparities in CVD risk. In attempt to reduce this gap in the literature, researchers and health organizations have recommended studying whether cultural and psychological mechanisms play a role in lifestyle CVD risks (Eyler et al., 2004; Rice, Katzel, & Waldstein, 2001; USDHHS, 2011). Yet, there is a dearth of literature concerning the associations of psychosocial factors, including negative emotions, with CVD-relevant health behaviors among middle-age Mexican-American women, an underrepresented population that experiences substantial health disparities (USDHHS, 2011).
American women, than in non-Hispanic Whites (Centers for Disease Control and Prevention, 2010; Wassertheil-Smoller, 2010). Depression is characterized as feeling blue or sad to the extent that it interferes with daily functioning (NIMH, 2010). Depression poses negative health consequences and is known to be comorbid with chronic illness, including CVD.

More specifically, depression has been found to be associated with adverse cardiovascular outcomes and mortality (Hayes, 2009), particularly among CVD patients (e.g., Van der Kooy et al., 2007). However, there is a lack of understanding concerning the role of depression in CVD and its possible effect in CVD risk progression. Although not all studies have found an association between depression and CVD (e.g., Shinn, Poston, Kimball, St. Jeor, & Foreyete, 2001), some previous empirical investigations have reported depression as an independent CVD risk predictor (e.g., Rice, Katznel, & Waldstein, 2001; Wassertheil-Smoller et al., 2004). Several mechanisms may explain the connection between depression and CVD. For instance, it has been postulated that the association between the two is indirect (Hayes, 2009; Rice et al., 2001). In other words, depression is believed to lead to unhealthy lifestyle practices which in turn increase CVD. Notably, this hypothesis has not been fully explored particularly among Mexican-American women.

Earlier work on depression and CVD risk factors among non-minority populations has reported that depression is associated with unhealthy behaviors. Depressive symptomatology is associated with a series of unhealthy factors, including lower overall dietary quality (Bonnet et al., 2004) and decreased physical activity (Bonnet et al., 2004; Roshanaei-Moghaddam, Katom, & Russo, 2009; Win et al., 2011). In the same regard, Christensen (1996) demonstrated that depressed individuals consume more carbohydrates than non-depressed individuals. Similarly, other studies have found that depressive symptoms are associated with higher caloric intake and lower physical activity (Simon et al., 2008; Perrino, Mason, Brown, & Szapocznik, 2009). Sleep quality is another health behavior that has been negatively associated with depression, such that higher depression scores are associated with poor sleep (Phelan, Love, Ryff, Brown, & Heidrich, 2010).

Furthermore, Wassertheil-Smoller et al. (2004) assessed the odds of having depression in relation to CVD risk factors across a large multiethnic sample that included Hispanic women. Depression was found to be associated with lifestyle practices that augmented the risk for CVD, including decreased physical activity and being overweight. In addition, across the few studies examining the role of depression on CVD risk among minority populations, depression has been found to be detrimental to CVD protective factors. For example, depressive symptoms are associated with poorer diets (Pagoto, 2008). Likewise, higher depression levels are indicative of subsequent sedentary behavior in older Hispanic adults as measured by physical activity (Perrino et al., 2009); in this same study physical activity was found not to be predictive of future depressive symptoms.

Anxiety and CVD health behaviors risk

Anxiety, characterized by a generalized sense of apprehension or foreboding (Nevid, Rathus, & Greece, 2008), has also been associated with unfavorable cardiovascular outcomes (Frasure-Smith & Lespérance, 2008). However, the effects of anxiety on behavioral CVD risk are still not well-understood. The literature suggests that having a history of anxiety is associated with elevated risks for developing CVD (Fan, Strine, Jiles, & Mokdad, 2006; Lows, Thurston, & Mathews; 2010; Suls & Bunde, 2005; Vogelzangs et al., 2010). Although the effects of anxiety on increased lifestyle CVD risk have been more modest than those found for depression, anxiety has been linked with higher physical inactivity levels and poorer diets (Bonnet et al., 2004). Given the probable role of anxiety as a determinant of health behavior risks, a need for further research in this area is warranted.

Acculturation and CVD health behavior risks

Research on minority populations has highlighted the need to address CVD risk factors among subgroups of the larger Mexican-American population by examining how acculturation relates to CVD health (Sundquist & Winkleby, 1999). Acculturation refers to the process of adopting new behaviors and beliefs as a result of coming in contact with a culture different from one’s own (Nevid et al., 2008; Velasquez et al., 2004). Language is the most commonly used proxy for acculturation (Thomson & Hoffman-Goetz, 2009); other measures of acculturation include nativity and length of time in the U.S.

There are significant differences in CVD risk factors among Mexican-American women based on acculturation, with U.S. born Spanish-speaking women having less favorable CVD risk profiles (Sundquist & Winkleby, 1998). Similarly, in a different study Sundquist (2001) found that when stratified by language spoken, Spanish-speaking Mexican-American women engaged in less healthy behaviors than their English-speaking Mexican-American counterparts. Nonetheless, most
of the existing literature on negative emotions and CVD risk reflects the results obtained from studying non-minority populations or from aggregating Latinos, including Mexican-Americans, despite population heterogeneity (e.g., Pagoto, 2008). This practice disregards potentially meaningful differences in health behaviors that could shed light on factors underlying CVD disparities.

There is minimal research on the association between acculturation and health behavior practices among Mexican-American women. The existing literature suggests that acculturation has predominantly a negative impact on healthy lifestyles. For instance, greater acculturation to the U.S. results in poorer diets, including less fruit and vegetable intake (Ghaddar, Brown, Pagán, & Días, 2010; Montez & Eschbach, 2008) and higher consumption of fat-related habits (Cantero, Richardson, Baezconde-Garbanati, & Marks, 1999; Neuhouser, Thompson, Coronado, & Solomon, 2004). Although not statistically significant, Cantero et al. (1999) reported a similar trend regarding sleep patterns and BMI, such that greater acculturation is associated with non-optimal sleep patterns and higher BMI. In contrast, it has been found that less acculturated individuals are more physically inactive than their more acculturated counterparts (Cantero et al., 1999; Ghaddar et al., 2010).

The current research

In summation, most of the existing literature on negative emotions and CVD risks has not focused on Mexican-American women and has not considered the role of acculturation. Thus, given the possible negative effects of depression and anxiety on health behaviors, the present study aims to elucidate a better understanding of CVD disparities. The present research examined the associations of negative emotions (i.e., depression and anxiety) with health behaviors and evaluated how acculturation relates to negative emotions and health behaviors in a randomly selected, community-based sample of healthy middle-aged Mexican-American women. Several health behaviors implicated in CVD risk were examined including: physical activity, dietary patterns, body mass index (BMI), and sleep quality. Based on a review of the literature, the following a priori-hypotheses were tested: (1) Negative emotions (i.e., depression and anxiety) will be associated with suboptimal levels of health behaviors (2) Increasing acculturation will be associated to negative emotions, (3) Acculturation will moderate the relationship between negative emotions and health behavior practices, and (4) With the exception of physical activity, increasing acculturation will be associated to unhealthy behaviors.

Methods

Participants

Data for this investigation came from Nuestra Salud, an observational study examining the role of socioeconomic, cultural, and psychosocial factors in CVD risk. A total of 321 Mexican-American women aged 40-65 enrolled in the study. Middle-aged women were of particular interest because of their higher risk for CVD. Women were considered eligible for participation if they self-identified as Mexican-American, were not pregnant or taking medications with sympathetic nervous system effects, and were free of diabetes, CVD, kidney disease, and cancer (other than skin cancer) within the last 10 years.

Measures

Participants were administered a survey and were given the option of completing the assessment in their preferred language. Besides demographic information (e.g., age, education, income), the questionnaire consisted of self-report assessments of depression and health behaviors (e.g., physical activity, dietary behaviors), which had previously been validated and translated. The version (i.e., English or Spanish) of the assessment was used as a proxy for language acculturation. Participants also completed physical measurements (height, weight, waist circumference), which were used to calculate their body mass index (BMI).

Center for Epidemiological Studies-Depression Scale (CES-DR). Depression was assessed using the revised CES-DR (Eaton, Muntaner, Smith, Tien, & Ybarra, 1999). This scale consists of 20 items measured on a 5-point Likert scale with responses ranging from 1 (0 to 1 day) to 5 (Nearly five days for two weeks). Items included statements like “I couldn’t get going” and “I lost interest in my usual activities.” Higher scores indicated higher depression.

State-Trait Anxiety Inventory (STAI). Anxiety was measured using a shortened version of the STAI (Spielberger, Sydeman, Owen, & Marsh, 1999), which included 10 items measured on a 4-point Likert scale from 1 (Almost never) to 4 (Almost always). Sample items included statements such as,” I feel nervous and restless” and “I feel like a failure.” Higher scores indicated greater anxiety.

Leisure Time Estimate Questionnaire (LTEQ) and International Physical Activity Questionnaire (IPAQ). Exercise was measured using the 4-item from LTEQ (Godin & Shepard, 1985), which asks participants to indicate the number of times per week they participate in mild,
moderate, or strenuous physical activity for at least 15 minutes. Sedentary behavior was assessed using 14 items from IPAQ (Van der Ploeg et al., 2002). Sedentary behavior was defined as the average sitting time across a set of domains, including leisure time, domestic and gardening activities, work-related physical activity, and transportation-related physical activity. A sample item included, “During the last 7 days, how many days did you walk for at least 10 minutes as part of work.” The primary hypotheses were tested using sedentary behavior as a continuous measure. The estimate of total Metabolic Equivalent of Task Units (i.e., METs) provided by IPAQ was used to determine if participants meet the criteria for moderate physical activity based on walking, a score of 30 MET-minutes or lower was considered as not meeting the criteria.

A rapid food screener to assess fat and fruit and vegetable intake. Dietary behaviors were assessed using the culturally adapted 27-item version of a rapid food screener to assess fat and fruit and vegetable intake (Block, Gillespie, Rosenbaum, & Jenson; 2000). Sample items included rating the frequency of selected food intake (e.g., green salad, potatoes, meats) using a 6-point Likert scale from 1 (less than one week) to 6 (2 or more times a day). With the exception of fat intake for the health behaviors profile, which was scored dichotomously (i.e., high fat intake was defined as consuming 30% or more energy from fat), the food screener scores were analyzed continuously in regards to all the primary hypotheses.

Pittsburgh Sleep Quality Index (PSQI). Participants’ overall sleep quality was assessed using a shortened version of the PSQI, which consisted of items 1-9 of the original version. Statements, such as “wake up in the middle of the night or early morning” were measured on a 4-point Likert scale from 0 (Not during the past month) to 3 (3 or more times a week), and then summed, with higher scores indicating poorer sleep quality. That is, the primary hypotheses were tested using the sleep quality variable continuously. The overall sleep quality for the behaviors profile of the sample was reported using the variable dichotomously, with a global sum of five or greater indicating poor sleep.

Data Analysis
Data were analyzed utilizing PASW 18 statistics software (PASW Inc, Chicago, IL, USA). Descriptive data analyses were conducted to obtain information on the sample characteristics and participants’ health behaviors. Univariate statistics were conducted to examine health behaviors across language groups. Bivariate analyses were computed to examine the relationship between negative emotions, acculturation, and health behaviors, with statistical control for socioeconomic status based on annual income. Analyses were also calculated separately by assessment language. The dependent variables were health behaviors, which included exercise and sedentary behavior; fiber, fat, fruit and vegetable intake; and overall sleep quality. The independent variables were depression, anxiety, and language acculturation. Linear regression was used to confirm the associations between main study variables.

Results
Sample characteristics are displayed in Table 1. The average age was 49.79 years (SD = 6.56). The majority of the sample was born in Mexico (72.9%) and reported living in the U.S an average of 26.89 years (SD = 12.35). Approximately 57% of participants reported yearly incomes above $35,000 and 204 (53.3%) reported some college education or more. Of the total sample, only 46 (15%) participants met the cut-off score (>16) of the clinical diagnosis criteria for depression.
Table 1

**Sample characteristics**

<table>
<thead>
<tr>
<th>Demographic Variable</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place of Birth</td>
<td></td>
</tr>
<tr>
<td>U.S.</td>
<td>84 (26.2%)</td>
</tr>
<tr>
<td>Mexico</td>
<td>234 (72.9%)</td>
</tr>
<tr>
<td>Language</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>135 (42.1%)</td>
</tr>
<tr>
<td>Spanish</td>
<td>186 (57.9%)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>≤0-8th grade</td>
<td>52 (16.2%)</td>
</tr>
<tr>
<td>Less than HS</td>
<td>55 (17.1%)</td>
</tr>
<tr>
<td>GED/HS diploma</td>
<td>40 (12.5%)</td>
</tr>
<tr>
<td>Some College</td>
<td>102 (31.8%)</td>
</tr>
<tr>
<td>4 year degree</td>
<td>49 (15.3%)</td>
</tr>
<tr>
<td>Graduate degree</td>
<td>20 (6.2%)</td>
</tr>
<tr>
<td>Income</td>
<td></td>
</tr>
<tr>
<td>Less than 15,000</td>
<td>33 (10.0%)</td>
</tr>
<tr>
<td>15,000 to 24,999</td>
<td>43 (13.4%)</td>
</tr>
<tr>
<td>25,000 to 34,999</td>
<td>53 (16.5%)</td>
</tr>
<tr>
<td>35,000 to 49,999</td>
<td>55 (17.1%)</td>
</tr>
<tr>
<td>50,000 to 74,999</td>
<td>62 (19.3%)</td>
</tr>
<tr>
<td>75,000 and over</td>
<td>66 (20.3%)</td>
</tr>
<tr>
<td>Depression Status</td>
<td></td>
</tr>
<tr>
<td>Non-depressed</td>
<td>271 (84.4%)</td>
</tr>
<tr>
<td>Depressed</td>
<td>48 (15%)</td>
</tr>
<tr>
<td>Health Behaviors Profile</td>
<td></td>
</tr>
<tr>
<td>≥ 5 Fruits &amp; Vegetables</td>
<td>217 (67.6%)</td>
</tr>
<tr>
<td>Percent of fat in diet at 30% or lower</td>
<td>277(70.7%)</td>
</tr>
<tr>
<td>Meets criteria for physical activity</td>
<td>94 (29.3%)</td>
</tr>
<tr>
<td>Adequate sleep quality</td>
<td>98 (30.55)</td>
</tr>
<tr>
<td>Current smoker</td>
<td>290 (90.3%)</td>
</tr>
<tr>
<td>Binge drinker</td>
<td>206 (64.2%)</td>
</tr>
</tbody>
</table>

Note. Total N = 321. Missing responses account for the inconsistent N values.

**Health behaviors profiles**

Table 1 presents the health behaviors profile of the entire sample. There were low rates of current smoking (9%) or heavy drinking (14%);
In contrast, the majority of the participants reported one or more food habits not meeting the recommended dietary values; 227 (70.7%) reported food patterns with more than 30% fat concentration and 217 (67.6%) indicated consuming inadequate amounts of daily fruits and vegetables servings (i.e., less than five servings of fruits and vegetables per day). Additionally, 94 (29.3%) participants did not meet criteria for moderate physical activity based on walking. Also, several respondents (30.5%) reported having poor sleep quality. Results showed that obesity was highly prevalent among this sample. Based on BMI, 123 (40.2%) were overweight (i.e., BMI 25 to 29.9); and 101 (33.2%) were obese (i.e., BMI ≥ 30).

Table 2

<table>
<thead>
<tr>
<th>Health Behaviors</th>
<th>English</th>
<th>Spanish</th>
<th>t</th>
<th>df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Sitting (daily min.)</td>
<td>294.14</td>
<td>209.02</td>
<td>4.88</td>
<td>235.30</td>
<td>0.001</td>
</tr>
<tr>
<td>Exercise (weekly min.)</td>
<td>21.55</td>
<td>17.63</td>
<td>1.67</td>
<td>272.04</td>
<td>0.09</td>
</tr>
<tr>
<td>Fruits &amp; Vegetables (daily servings)</td>
<td>4.00</td>
<td>4.32</td>
<td>1.37</td>
<td>279.43</td>
<td>0.17</td>
</tr>
<tr>
<td>Total Fiber (daily grams)</td>
<td>17.24</td>
<td>18.58</td>
<td>-0.19</td>
<td>285.01</td>
<td>0.03</td>
</tr>
<tr>
<td>Total Fat (daily grams)</td>
<td>90.26</td>
<td>88.11</td>
<td>0.86</td>
<td>283.24</td>
<td>0.39</td>
</tr>
<tr>
<td>Dietary Cholesterol (daily grams)</td>
<td>252.61</td>
<td>245.62</td>
<td>0.86</td>
<td>283.24</td>
<td>0.39</td>
</tr>
<tr>
<td>Overall Sleep Quality</td>
<td>4.80</td>
<td>4.72</td>
<td>0.22</td>
<td>308.50</td>
<td>0.82</td>
</tr>
</tbody>
</table>

Language and health behaviors

Language acculturation was found to be correlated to sitting time ($r = -.28, p < .01$) and to diets with higher consumption of fiber ($r = .12, p < .05$). In other words, Mexican-American women with low language acculturation reported higher average sitting time than their English-speaking counterparts. Spanish-speaking women also consumed more fiber as part of their diets. In addition to bivariate analyses, independent-samples t-tests were conducted to compare health behaviors for English-speaking and Spanish-Speaking participants. Overall, English-speaking women reported to engage in less healthy practices (see Table 2); however, there were no significant associations between language acculturation and negative emotions ($p > .05$).

Table 3

<table>
<thead>
<tr>
<th>Negative Emotion</th>
<th>Health Behaviors</th>
<th>Avg. Sitting</th>
<th>Exercise</th>
<th>Fr. Veg. Ser.</th>
<th>Total Fiber</th>
<th>Total Fat</th>
<th>Diet Chol</th>
<th>Sleep Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>Entire sample</td>
<td>0.16*</td>
<td>-0.07</td>
<td>-0.17*</td>
<td>-0.18*</td>
<td>0.06</td>
<td>0.06</td>
<td>0.44**</td>
</tr>
<tr>
<td></td>
<td>English only</td>
<td>0.14</td>
<td>-0.07</td>
<td>-0.07</td>
<td>0.03</td>
<td>0.24*</td>
<td>0.24*</td>
<td>0.44**</td>
</tr>
<tr>
<td></td>
<td>Spanish only</td>
<td>0.20*</td>
<td>-0.13</td>
<td>-0.32*</td>
<td>-0.30*</td>
<td>-0.02</td>
<td>-0.02</td>
<td>0.46**</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Entire sample</td>
<td>-0.01</td>
<td>-0.36</td>
<td>-0.20*</td>
<td>-0.19*</td>
<td>0.20*</td>
<td>0.20*</td>
<td>0.22*</td>
</tr>
<tr>
<td></td>
<td>English only</td>
<td>0.03</td>
<td>-0.045</td>
<td>-0.07</td>
<td>-0.07</td>
<td>0.38**</td>
<td>0.38**</td>
<td>0.25*</td>
</tr>
<tr>
<td></td>
<td>Spanish only</td>
<td>0.01</td>
<td>-0.03</td>
<td>-0.33**</td>
<td>-0.33**</td>
<td>0.10</td>
<td>0.01</td>
<td>0.20*</td>
</tr>
</tbody>
</table>


Negative emotions and health behaviors

Depression was found to be inversely related to many of the health behaviors. Higher depression scores were significantly correlated with lower physical activity levels as measured by exercise ($r = -.16, p < .01$) and to higher average sitting time as well ($r = .17, p < .01$). Likewise, increased depression was significantly associated with lower total fiber intake ($r = -.19, p < .01$) and fewer fruits and vegetables servings ($r = -.20, p < .01$). In regards to sleep patterns, elevated
depression scores were negatively associated with poor sleep quality \( (r = .55, p < .01) \).

In addition, results showed that anxiety was related to detrimental health behaviors, particularly dietary habits. Increased anxiety was correlated with higher fat intake diets \( (r = .19, p < .01) \). Higher anxiety levels were also associated with lower intake of total fiber \( (r = -.20, p < .01) \) and fewer fruits and vegetables servings \( (r = -.21, p < .01) \). Anxiety was associated with decreased sleep quality as well \( (r = .38, p < .01) \).

After accounting for socioeconomic status based on annual income all the bivariate associations found between negative emotions and health behaviors remained significant, except for depression in relation to exercise (see Table 3).

**Language, negative emotions, and health behaviors**

When stratified by language spoken, results revealed that the associations between negative emotions and health behaviors among Mexican-American women varied according to language acculturation; for English-speaking women, increased levels of negative emotions were associated with higher consumption of fat and cholesterol \( (p < .05) \), whereas for Spanish-speaking women neither depression or anxiety were indicative of higher fat and cholesterol intake \( (p > .05) \). More specifically, for Spanish-speaking women, negative emotions were related to consumption of fewer fruits and vegetables and less fiber \( (p < .05) \). Also, among the Spanish-speaking participants depression but not anxiety was associated with sedentary behavior (see Table 3).

**Discussion**

This study contributes to our understanding of the role of negative emotions and language acculturation in relation to health behaviors among a Mexican-American sample. The present research shows that negative emotions negatively influence dietary choices and sleep quality, such that both depression and anxiety were related to poorer diet and decreased sleep quality. Depression was found to be associated with a sedentary lifestyle. Considering the low levels of health-protective behaviors among this population, and given that factors such as dietary patterns are modifiable risk factors for many chronic diseases, the current findings provide important information about health risk behaviors in Mexican-American women.

The primary prediction that negative emotions would be associated with sub-optimal levels of health behaviors was supported. The finding that depression and anxiety related to poorer nutrition is of important public health significance because diet is a major risk factor that Mexican-American women can modify to lower their risk for many serious health conditions that can result in death, such as diabetes and CVD. Specifically, consuming fiber and fruits and vegetables has been found to decrease blood cholesterol level \( \text{(Meeks, Heit, & Page, 2008)} \). Moreover, maintaining lower cholesterol levels reduces the risk for many chronic illnesses, particularly those associated with CVD \( \text{(Meeks, Heit, & Page, 2008)} \). Findings highlight the possible implications of negative emotions to women’s health risk profiles, especially when considering that depression and anxiety are common mental health issues affecting women and that higher depression rates are observed among Mexican-American women than in non-minority White women \( \text{(Crespo, Smit, Andersen, Carter-Pokras, & Ainsworth, 2010; Eyler et al., 2004)} \). These results are consistent with the few studies that have examined lifestyle CVD risk and depression among Mexican-Americans and found that depression is negatively associated with healthy behaviors \( \text{(e.g., Pagoto et al., 2009; Wassertheil-Smoller et al., 2004)} \). Findings also draw attention to the importance of monitoring health behaviors when experiencing negative emotions; women with depressive and anxiety symptomatology may engage in poorer lifestyle behaviors, thus increasing their risk for developing chronic diseases.

Results did not support the prediction that increasing acculturation is associated with negative emotions. The lack of association between acculturation and negative emotions in this study does not negate the possibility that low acculturation to the dominant culture as measured by language may be detrimental to mental health and psychological well-being as some studies have suggested \( \text{(e.g., Familiar, Borges, Orozco, & Medina-Mora, 2011; Ortega, Rosenheck, Alegría, & Desai, 2000)} \). A possible explanation for this lack of association is that participants constituting this sample were residents of two border communities in San Diego located a few miles away from the US-Mexico border with a high concentration of Latinos, predominantly Mexican-Americans. Thus, the ethno-geographic composition of these border communities fosters interactions within Mexican-Americans from the same or similar ethno- cultural background, which in turn may be protective against the acculturative stress associated with adapting to a new culture. Similarly, the proximity to the border may allow them to stay in direct contact with their home country as well. As a result, they may encounter less pressure to become
immersed in U.S. culture and therefore, experience less psychological distress. When analyzed by language spoken, results showed that the associations between negative emotions and health behaviors among Mexican-American women varied according to language acculturation. Among the English-speaking women, increased levels of negative emotions were associated with higher consumption of dietary cholesterol and fat, whereas for Spanish-speaking negative emotions were related to consumption of fewer fruits and vegetables and less fiber. These findings are particularly significant when taking into account that there is minimal research focused on Mexican-American women and that little is known about differences in health behaviors among sub-groups of this population. This information can provide healthcare providers a better understanding of specific ways depression and anxiety can negatively impact the health behavior practices of English-speaking and Spanish-speaking Mexican-American women. Health professionals should encourage those women experiencing negative emotions with low language acculturation to retain their healthy dietary practices; for those with greater use of the English language they should particularly promote less fat intake and provide information about the importance of consuming healthier foods.

Also, this study found support for the prediction that there are significant differences between language groups and health behaviors. That is, overall, English-speaking women reported engaging in less healthy practices. Findings are consistent with previous research (e.g., Ghaddar et al., 2010; Montez & Eschbach, 2008; Neuhouser et al., 2004) suggesting that as Mexican-Americans acculturate, some of their health-protective dietary practices, such as consuming high levels of fruits and vegetables, tend to decrease. Unlike results from a previous study (Montez & Eschbach, 2008), the present findings did not find a significant relationship between higher acculturation and higher fat consumption. However, as mentioned earlier, when disseminating the associations between negative emotions and health behaviors higher intakes of fat and dietary cholesterol were associated with greater acculturation (i.e., English-speaking). Interestingly, it was found that greater English language use was associated with higher sedentary behavior (i.e., higher sitting time) but it was also related to exercising more; these findings suggest that higher acculturated women are more likely to have sedentary jobs or take advantage of modern conveniences that increase sedentary behaviors, while also adopting U.S. habits of exercising.

Limitations

There are some limitations worth mentioning in the current study. One of the restrictions is that data in this study included self-report measures and participant recall biases may have been present. Second, this study focused on middle-aged Mexican-American women near the US-Mexico border and therefore findings may not generalize to all U.S. Mexican-American women. Third, this study was cross-sectional in design thus limiting our ability to infer causality or directionality in the associations. For example, it is possible that less healthy dietary and physical activity behaviors foster the development of depression and anxiety symptoms. Fourth, the results reported herein were obtained from studying a generally healthy sample; therefore, it is possible that the associations found in this study may in fact be stronger among clinically depressed and anxious Mexican-American populations.

Conclusions

Despite the noted limitations, the current research adds knowledge to an underrepresented sector in health psychology literature. The present study is one of the few that have examined associations between cultural and emotional factors in Mexican-American women; an underrepresented population that experiences substantial health disparities. In sum, results suggest that depression and anxiety contribute to adverse behavioral health risk profiles and highlight the need to address negative emotions in relation to adherence to healthy lifestyle recommendations. Findings demonstrate differences in health behaviors among English-speaking and Spanish-speaking middle-aged Mexican-American women, especially when examining the detrimental effects of negative emotions. Findings may help inform culturally-tailored prevention programs aimed at promoting lifestyle changes among Mexican-American women. To better understand the role of negative emotions on health behaviors among this population, additional studies should assess the effects of negative emotions with health behavior practices longitudinally. Future research could benefit from studying the association between negative emotions and cultural barriers, including language with health behavior practices among clinically depressed and anxious populations.

References


Borderline racist: Racial minority reactions to Arizona's immigration law

Bradley M. Weisz

Abstract
The signing of SB 1070 (i.e., the Arizona immigration law) sparked nation-wide controversy due to its potential allowance of police officers to racially profile Latino Americans. The present research investigated the psychological impact of exposure to this potentially racist law for racial minorities directly targeted by the law (e.g., Latino Americans), compared to racial minorities not directly targeted (i.e., Asian and Black Americans). Moreover, the present research examined whether the way in which the law is framed (i.e., as a purely legal issue, or as a political vehicle) differentially affects racial minorities’ psychological engagement with America. As hypothesized, Latinos participants became less motivated to engage in American behaviors after exposure to politicized framings of SB 1070, compared to an actual passage of the law. On the other hand, Black participants experienced a boost in their motivation to engage in American behaviors when exposed to politicized framings of SB 1070, compared to an actual passage of the law. Also as expected, Asian participants’ motivation to engage in American behaviors when not affected by the various framings of SB 1070. These findings attest that the politically charged rhetoric surrounding controversial social issues, commonly found in the national media, may negatively influence ethnic minorities’ motivation to participate in American society (e.g., not voting in elections). Thus, potentially contributing to the maintenance of social disparities that exist between racial groups in America.

The signing of SB 1070 (i.e., the Arizona immigration law) sparked a heated national debate concerning appropriate illegal immigration policy in America. Much of the controversy centered around whether or not the law would allow police officers to racially profile Latino Americans, thus infringing on their civil rights. With its racial implications, SB 1070 quickly became a nationally relevant issue. A public opinion poll (AP-Univision, 2010) conducted shortly after the law was passed, found that a majority of Americans thought that SB 1070 would, in fact, lead to the unfair stopping and questioning of Latino Americans (i.e., racial profiling). The potentially racist nature of SB 1070 launched it into the national spotlight, gaining it considerable media attention. Arguably, one of the driving forces behind much of the controversy surrounding SB 1070 was the way in which the national news media covered it. Media outlets often sensationalized the law by using strong rhetoric that was usually coupled with a specific political slant. While some media outlets portrayed the law as a vital step toward making America safer, other media outlets portrayed it as a law that would infringe on the civil rights of Latino Americans. These differing politicized portrayals of SB 1070 convey strikingly different messages that, we argue, may differentially affect the way in which the law is perceived, and potentially have a profound psychological impact on those targeted by the law.

This article draws upon various social psychological phenomena to explore the psychological implications that SB 1070 may have on racial minorities in America. To the best of our knowledge, no research has directly examined the impact that potentially racist legislation may have on racial minorities directly targeted (e.g., Latinos), compared to those not directly targeted by the legislation (e.g., Blacks and Asians). Moreover, we posit that perceptions of this potentially racist legislation may also depend on the manner in which it is presented. The current research used the Arizona immigration law, along with the sensationalized rhetoric that surrounded it, as a catalyst for our investigation of these issues.

When discriminatory legislation targets your ethnic group

Under the constitution of the United States, American citizens are guaranteed certain unalienable civil rights. Yet, it is widely thought that SB 1070 would lead to the racial profiling of Latino Americans, thus infringing on their civil rights. If SB 1070 threatens to withhold certain rights from Latinos, rights that should be guaranteed to all Americans, then might exposure to this law cause Latinos to feel less American? The extent to which Latino Americans are seen as prototypically American has recently been addressed by Devos, Gavin, and Quintana (2010). Results from this research show that both White and Latino Americans perceive Latino Americans as less American than White Americans.

Given that Latino Americans may not see themselves as being prototypically American, how might they react to a law that has the potential to treat them as less American? No research that we are unaware of directly examines this question, yet related research demonstrates that one strategy racial minorities...
use to deal with exposure to prejudice is to psychologically disengage from the domain in which they are negatively stereotyped (e.g., Keller & Dauenheimer, 2003; Major, Spencer, Schmader, Steele, 1997; Wolfe, & Crocker, 1998;). For instance, Major et al. (1998) found that Blacks were less affected by negative feedback on an academic test when they thought the test was biased against their group. In other words, as a way to cope with racial bias, Blacks disengaged their self-concept from the domain of academic achievement, making negative feedback less impactful. Moreover, research has found that members of negatively stereotyped groups will actually exhibit less effort in domains where their group is stereotyped (Davies, Spencer, Quinn, & Gerhardtstein, 2002; Stone, 2002). For instance, Davies et al. (2002) found that when prompted with gender-stereotypic cues, women attempted fewer math problems and more verbal problems on a subsequent task, compared to women not prompted with such cues. These effects demonstrate that women actually began to embody the stereotype as a function of being exposed to cues that activated the stereotype. Thus, in addition to psychologically disengaging from negatively stereotyped domains, individuals may literally disengage, by not participating in those domains and/or disengaging in behaviors representative of the domains.

If psychological disengagement from negatively stereotyped domains can occur from exposure to a localized source, such as a biased test, then might it also occur from exposure to a source that is thought to be more widespread, such as discriminatory legislation? Though past research demonstrates that exposure to pervasive prejudice against one’s ingroup can have harmful psychological effects (Branscombe, Schmitt & Harvey, 1999; Kaiser, Major, & McCoy, 2004; Major, Kaiser, McCoy & Major, 2003; O’Brien, & McCoy, 2007; Schmitt, Branscombe, Kobrynowicz, & Owen, 2002) no research has yet investigated whether exposure to pervasive prejudice can result in a more extreme form of psychological disengagement—disengagement from one’s country. The present research addresses this issue by examining whether exposure to a law that is widely thought to treat Latinos as less American, can cause them to psychologically disengage from America, manifesting itself in less motivation to engage in prototypical American behaviors (e.g., voting in elections).

When discriminatory legislation targets another ethnic group

As stated earlier, the controversy surrounding SB 1070 revolves around whether or not the law could lead to the racial profiling of Latino Americans. Although it is tacitly understood that the law does not directly target Black or Asian Americans, it seems reasonable to assume that the racial implications of the law may make it a pertinent issue for other racial minorities living in America. Intuitively, Black and Asian Americans (racial groups that both have histories of being racially profiled in America) might empathize with Latinos’ sentiment against this potentially racist law. However, we suggest that exposure to SB 1070, a law that has the potential to treat Latinos as less American, may cause members of racial minority groups who contend with similar threats (e.g., unfair treatment by police officers; i.e., Blacks) to feel more American. In other words, there may be a sense of relief for Black Americans since they feel that their group is not being directly targeted by prejudice in this instance. Support for this notion comes from past research, which demonstrated that being cognizant of a negative stereotype associated with an outgroup in a certain domain can result in a psychological boost with regard to that domain, a phenomenon known as stereotype lift (see Walton & Cohen, 2003 for review). More specifically, when one becomes aware of the negative stereotype of poor ability associated with an outgroup in a certain domain, they end up performing better on a subsequent task within that domain, compared to when they are not aware of the negative outgroup stereotype. This stereotype lift effect has emerged with regard to Whites becoming cognizant of the negative stereotype of poor intellectual ability associated with African Americans (McKay, Doverspike, Bowen-Hilton, & Martin, 2002; Steele & Aronson, 1995;), as well as with men being reminded of the negative stereotype of poor math ability associated with women (Inzlicht & Ben-Zeev, 2000; Marx & Roman, 2002). Extending this line of reasoning, we posit that Blacks may experience a form of stereotype lift (i.e., a boost in feeling American) after exposure to a law that is widely thought to treat Latinos as less American (i.e., SB 1070).

Unlike Blacks, however, we suggest that Asians may not find SB 1070 particularly threatening. Indeed, Asians are often referred to as the “model minority” in America (Wong, Lai, Nagasawa, & Lin 1998). This “status” implies that, on average, Asians’ are better off compared to other racial minority groups in most major societal statistics, such as income and education level. Past research suggests that members of privileged social groups experience less psychologically harm when exposed to prejudice than do members of disadvantaged social groups (Schmitt et al., 2002). Moreover, we posit that the negative connotations associated with SB 1070 (e.g., racial profiling, unfair treatment by police) are, arguably, not particularly relevant to Asians. Past research has found that negative stereotypes associated with one’s group only become psychologically harmful when one considers those stereotypes to be self-relevant (Marx & Stapel, 2006). In sum, because Asians hold a somewhat privileged “model minority” status in America, a potentially racist law might not threaten
them, especially because negative implications of the law are less relevant to their group. Therefore, we posit that exposure to SB 1070 would not affect Asians’ psychological engagement with America.

**Framing the Arizona immigration law**

An important aspect surrounding SB 1070 is the role the news media played in making the law a nationally relevant issue. Quite often, the media coverage of SB 1070 was coupled with a certain political slant. While some media outlets highlighted the positive impact the law would have (i.e., securing America’s borders with Mexico), other outlets highlighted the negative effects the law could have on certain American citizens (i.e., racial profiling of Latino Americans). We posit that these different portrayals of SB 1070 may differentially affect Latinos and Blacks’ psychological engagement with America. Not surprisingly, we suggest that Latinos may feel more threatened by an approving portrayal of the Arizona immigration law because it endorses a law that is widely thought to be discriminatory against their racial group. Moreover, past research (Apfelbaum, Sommers, & Norton, 2008) suggests that Latinos may also be more apt to interpret a pro-law perspective as threatening, because it highlights the positive aspects of a potentially racist law, while downplaying (or ignoring) the issue of race. Thus, we argue that exposure to an approving portrayal of SB 1070 may lead to considerable psychological disengagement from America for Latinos. On the other hand, a disapproving portrayal of SB 1070 should not completely mitigate the threatening nature of the law for Latinos. A typical anti-law portrayal condemns the law as being unconstitutional, yet it also highlights the fact that the law may target Latinos. Thus, we suggest that, because the anti-law portrayal emphasizes the fact that Latinos are the supposed targets of the law, exposure to this portrayal of the law may also be threatening to Latinos (albeit to a lesser extent than a pro-law portrayal).

These different politicized portrayals of SB 1070 may also have different effects on Blacks’ reactions to the law. Because Blacks may experience a boost in their psychological engagement with America after exposure to SB 1070, we posit that this effect would be most pronounced for Blacks when the law is portrayed in an approving light. We further contend that a disapproving portrayal of SB 1070 may lessen Blacks’ boost in psychological engagement with America. Though the anti-law portrayal clearly states that SB 1070 targets Latinos, it also may threaten Blacks by making salient the negative effects of being targeted by racial profiling. Thus, exposure to the anti-law perspective may improve Blacks’ psychological engagement with America, but to a lesser extent than exposure to the pro-law portrayal. As we argued earlier, the racial implications of SB 1070 may be less relevant to Asians, in general. Moreover, due to their “model minority” status, we posit that Asians would be less affected by threats to their group, compared to other racial minority groups. Because of this, the different politicized portrayals of the law should not impact Asian Americans’ psychological engagement with America.

**The Present Research**

In this study, we capitalized on the national controversy concerning SB 1070 to investigate the psychological implications of this potentially racist legislation for racial minorities who are directly targeted (i.e., Latinos), compared to racial minorities who are not directly targeted by the law (i.e., Blacks, Asians). Moreover, we investigated whether the way in which the legislation is framed differentially affects the psychological impact of being exposed to the law.

For this study, we made the following predictions. When Latino participants are exposed to a politicized passage about SB 1070, they will be less motivated to engage in conceptually American behaviors compared to when they are exposed to an actual passage from the law (i.e., no political slant). In other words, when the law is framed as threatening to their group, Latino participants should experience more psychological disengagement from America than when the law does not explicitly threaten their group. Moreover, we predicted that Latino participants would be less motivated to engage in prototypically American behaviors when exposed to a passage that approves, compared to one that disapproves, of SB 1070. For Black participants, we predicted that, instead of feeling threatened by SB 1070, they would feel a sense of relief that their group is not being targeted. Thus, we predicted that Black participants would be more motivated to engage in prototypically American behaviors after they were exposed to the politicized passages, compared to an actual passage, about the law. In other words, when the law is framed as threatening toward Latinos, Black participants should experience a boost in their psychological engagement with America, compared to when the law does not explicitly threaten Latinos. We further predicted that Black participants would be more motivated to engage in prototypically American behaviors after being exposed to a passage that approves, as opposed to disapproves, of the law. We did not expect that exposure to the different law framings would have an effect for Asian participants.

In addition to measuring participants’ motivation to engage in prototypical American behaviors, we also included a measure of explicit American identity to further elucidate the potential effects that exposure to SB 1070 may have for different racial groups. In past research (e.g., Devos et al., 2010), American identity was measured in a relative sense (e.g., comparing whether a White American is more American than a
Latino American). By using an explicit American identity measure, without a comparison standard (i.e., a White American), we wanted to capture the extent to which participants’ subjectively saw themselves as American. This point seems key given that past research (e.g., Steele, Spencer, & Aronson, 2002) has shown that negative effects only occur in stereotyped contexts for those who are identified and care about the domain in question. In order to examine this line of reasoning, we explicitly asked participants at the beginning of our study to indicate the extent to which they identified as being American. We posit that SB 1070 would have more of an effect on participants’ psychological engagement with America for those who explicitly endorse their American identity. Put another way, if participants are not highly identified with America in the first place, then they will not be affected by a law that threatens to treat certain racial minorities as less American.

Method
Participants and Design
The present study examined the psychological and behavioral reactions to SB 1070 using an online survey hosted by Amazon’s Mechanical Turk (MTurk; see Buhrmester, Kwang, & Gosling, 2011). A total of 114 adult Americans (Black American = 45, Latino American = 34, Asian American = 35) took part in exchange for a small monetary payment. We used a 3 (Target Race: Asian, Black, Latino) x 3 (Law Framing: Actual Law, Anti-law, Pro-law) between-participants design.

Procedure
Once participants logged on to the study website, they were randomly assigned to one of three experimental conditions. Each of these conditions consisted of a passage about SB 1070 (two conditions had political framings of SB 1070, while the other condition had an actual excerpt from the law).

Framing SB 1070. For each law-framing condition participants were instructed to read a passage (all of similar length) about SB 1070. In the Pro-Law condition, the passage was written so that it expressed approval of the law by stating a number of problems that the law would help curb (e.g., “Taking care of the illegal immigration problem in Arizona will cut down on crime.”). In the Anti-Law condition, the passage was written so that it expressed disapproval of the law by stating that the law could lead to racial profiling (e.g., “SB 1070 seems to allow law enforcement officers to use the color of someone’s skin to make a decision on whether or not to stop someone.”). The Pro-Law and Anti-Law passages were written so that they contained typical arguments often seen in the national news media. In the Actual Law condition, the passage provided participants with the portion of the law that has evoked much of the national controversy (e.g., “A law enforcement officer, without a warrant, may arrest a person if the officer has probable cause to believe that the person has committed a public offense that makes the person removable from the United States.”). After reading their respective passage, participants were instructed to provide a 1-2 sentence summary of the passage. After being exposed to one of the three law-framing conditions, participants were asked to complete a survey that focused on their current beliefs.

Explicit American identity. Participants were asked to indicate the percent to which they identified with their American identity on a scale ranging from 0 (not at all identity) to 100 (completely identify). The American identity item was presented along with four other social identity items (e.g., “gender”) that were chosen because we felt that they would not be influenced by the law framing manipulation. The social identity items were presented randomly across participants, and participants could indicate being completely or not at all identified with any of the five items.

Motivation to engage in “American” behaviors. Participants were also asked to indicate the extent to which they were motivated to engage in certain behaviors. Of the eleven behavioroid items used, five of these formed the constructs of interest in the present research: American civic duties, political voice, and collective action. These three constructs were chosen in order to capture participants’ motivation to engage in American society, with the logic being that if participants are psychologically engaged with America, then they will be more motivated to engage in these behaviors. The American civic duties variable was composed of two items ($r = .42, p < .01$) that focused on behaviors that Americans are legally bound to perform (i.e., “pay taxes” and “serve on a jury.”). The political voice variable was composed of two items ($r = .40, p < .01$) that focused on behaviors reflective of a person’s motivation to express their political concerns (i.e., “vote in elections” and “call your congress person if you had a concern.”). The collective action variable was a single item that focused on a person’s willingness to enact social change (i.e., “take part in a protest demonstration.”). The remaining six behavioroid items were used as fillers and were chosen to be non-reactive to the law-framing manipulations (e.g., “invest money in the stock market”). Presentation of the behavioroid items were randomized across participants and measured on 1 to 7 scales anchored with the labels (not at all motivated) and (very motivated), respectively.

Demographics. In the final portion of the survey participants were asked to provide basic demographic information, such as their gender, age, ethnicity, level of education, annual income, the city and state in which they currently reside, and their political beliefs.
Law-framing pre-test. In order to establish that our law-framing passages were perceived in the intended ways we had an independent sample of 24 White adult Americans (age: M = 36.42, SD = 10.64) read each passage, and then respond to four questions about the passage’s content. To examine whether the passages differed in emotionality participants were asked to respond to the following statement: “I found this passage to be emotionally charged”. Responses were recorded on a 7-point scale anchored with the terms 1 (strongly disagree) to 7 (strongly agree). As expected, results revealed that the Actual Law passage (M = 2.92) was judged as being less emotionally charged relative to the average of the two politicized versions of the law (M = 5.75), F(1, 23) = 65.33, p < .01, η² = .74. Importantly, the two politicized versions of the law did not reliably differ in emotionality (Anti-Law = 5.92 versus Pro-Law = 5.58), F(1, 23) = 2.24, p > .15.

The next three questions focused only on the two politicized versions of the law. To establish that the passages were believable, participants responded to the following question: “Regardless of your personal beliefs, how likely is it that this argument could be found in the news?”. Responses were recorded on 7-point scales with the endpoints labeled 1 (not at all likely) and 7 (very likely). Importantly, there was no difference in believability between the Anti-Law (M = 5.54) and Pro-Law (M = 5.67) passages, F(1, 23) = .095, p > .76. Participants then responded to two questions concerning the politicized nature of the passages. The first question was: “How would you characterize this passage’s stance on the Arizona immigration law?”, anchored with the labels 1 (disapproves of the law) and 7 (approves of the law). As intended, the Pro-Law (M = 6.67) passage was seen as more approving of the law than was the Anti-Law (M = 1.46) passage, F(1, 23) = 227.02, p < .01, η² = .91. The second question was: “Does this passage favor a political perspective?”, anchored with the terms 1 (liberal) and 7 (conservative). Again we found a reliable difference, such that the Anti-Law (M = 2.33) passage was seen as favoring a politically liberal perspective while the Pro-Law (M = 5.62) passage was seen as favoring a politically conservative perspective, F(1, 23) = 50.28, p < .01, η² = .69.

Results and Discussion

Explicit American identity

We submitted participants’ explicit American identity scores to a 3 (Participant Race: Asian, Latino, Black) x 3 (Law Framing: actual law, anti law, pro law) Analysis of Covariance (ANCOVA), controlling for education level (see Table 1). The only effect that emerged was a main effect for Participant Race, F(2, 101) = 9.86, p < .01, η² = .16, all other Fs < 2.09. To elucidate this Participant Race effect, we conducted simple effects tests.

These tests revealed that Asian participants’ explicit American identity scores (M = 61.45) were reliably lower than the average score for Black and Latino participants (M = 80.65), F(1, 101) = 15.48, p < .01, η² = .13. Moreover, we found that Black participants’ explicit American identity scores (M = 85.39) were somewhat higher than Latinos’ scores (M = 75.90), F(1, 101) = 3.20, p < .08, η² = .03. Interestingly, the two racial groups that we hypothesized as being most sensitive to SB 1070 were also the groups that were most explicitly identified with being American. Based on past research (Steele et al., 2002), these findings suggest that Black and Latino participants, by having more of stake in their American identity than Asian participants, may be more reactive to the different portrayals of SB 1070.

Motivation to engage in “American” behaviors

American civic duties. We submitted participants’ civic duties scores to a 3 (Participant Race: Asian, Latino, Black) x 3 (Law Framing: actual law, anti law, pro law) ANCOVA, controlling for education level (see Table 1). Results revealed an effect for education level, F(1, 101) = 12.56, p < .01, η² = .11, and a main effect for Participant Race, F(2, 101) = 8.36, p < .03, η² = .14. We did not find a main effect for Law Framing, F < 1. Most central to our hypotheses was the reliable Participant Race by Law-Framing interaction, F(4, 101) = 4.13, p < .01, η² = .14. To interpret this interaction we conducted simple effects tests according to our theoretical rationale.

Consistent with our hypotheses, Asian participants’ civic duties scores did not reliably differ between the actual law condition and the average of the two politicized law-framing conditions, nor did they differ between the two politicized framing conditions, both Fs < 1.00. As expected, Black participants’ civic duties scores were somewhat higher in the politicized law-framing conditions (M = 5.06), compared to the actual law condition (M = 3.17), F(1, 101) = 3.47, p < .07, η² = .03. However, Black participants’ civic duties scores did not reliably differ between the two politicized law-framing conditions, F < 1.00. Also as hypothesized, Latino participants’ civic duties scores were lower in the politicized law-framing conditions (M = 3.17), compared to the actual law condition (M = 4.92), F(1,101) = 5.48, p < .03, η² = .05. We observed no reliable difference in Latino participants’ civic duties scores between the two politicized law-framing conditions, F < 1.00.

Political voice. We submitted participants’ political voice scores to a 3 (Participant Race: Asian, Latino, Black) x 3 (Law Framing: actual law, anti law, pro law) ANCOVA, controlling for education level (see
Table 1). No reliable main effects were found for education level, Participant Race, or Law Framing, all $F$s < 1.63. As expected, a reliable Participant Race by Law-Framing interaction emerged, $F(4, 101) = 5.33, p < .01, \eta^2 = .18$. To interpret this interaction we conducted simple effects tests according to our theoretical rationale.

Table 1: Mean (SD) American Identity, Civic Duties, Political Voice, and Collective Action scores as a Function of Participant Race and Law Framing

<table>
<thead>
<tr>
<th></th>
<th>Asian Participants</th>
<th>Black Participants</th>
<th>Latino Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Law Framing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual Law</td>
<td>Anti-Law</td>
<td>Pro-Law</td>
</tr>
<tr>
<td>American Identity</td>
<td>58.91 (26.05)</td>
<td>56.43 (23.23)</td>
<td>69.02 (23.02)</td>
</tr>
<tr>
<td>Civic Duties</td>
<td>4.53 (1.35)</td>
<td>4.38 (1.96)</td>
<td>4.25 (1.78)</td>
</tr>
<tr>
<td>Political Voice</td>
<td>4.80 (1.41)</td>
<td>4.04 (1.69)</td>
<td>4.08 (1.62)</td>
</tr>
<tr>
<td>Collective Action</td>
<td>3.57 (1.81)</td>
<td>3.00 (1.67)</td>
<td>3.12 (1.69)</td>
</tr>
</tbody>
</table>

Consistent with expectations, Asian participants’ political voice scores did not differ between the actual law condition and the average of the two politicized law-framing conditions, nor did they differ between the two politicized framing conditions, both $F$s < 1.00. As expected, Black participants’ political voice scores were somewhat higher in the politicized law-framing conditions ($M = 5.07$), compared to the actual law condition ($M = 3.79$), $F(1, 101) = 3.57, p < .07, \eta^2 = .03$. However, Black participants’ political voice scores did not reliably differ between the two politicized law-framing conditions, $F < 1.00$. Also as anticipated, Latino participants’ political voice scores were lower in the politicized law-framing conditions ($M = 3.51$), compared to the actual law condition ($M = 5.66$), $F(1, 101) = 7.45, p < .01, \eta^2 = .07$. We found no reliable difference in Latino participants’ political voice scores between the two politicized law-framing conditions, $F < 1.00$.

Collective action. We submitted participants’ collective action scores to a 3 (Participant Race: Asian, Latino, Black) x 3 (Law Framing: actual law, anti law, pro law) ANCOVA, controlling for education level (see Table 1). Results revealed an effect for Law Framing, $F(2, 100) = 3.92, p < .03, \eta^2 = .04$. We did not find
effects for education level, or Participant Race, Fs < 1.00. Most central to our hypotheses was the reliable Participant Race by Law-Framing interaction, $F(4, 100) = 2.76, \ p < .04, \ \eta^2 = .10$. To interpret this interaction we conducted simple effects tests according to our theoretical rationale.

As expected, Asian participants’ collective action scores did not reliably differ between the actual law condition and to the average of the two politicized law-framing conditions, nor did they differ between the two politicized framing conditions, both Fs < 1.00. Unexpectedly, Black participants’ collective action scores also did not reliably differ between the actual law condition and to the average of the two politicized law-framing conditions, nor did they differ between the two politicized framing conditions, both Fs < 1.00. However, consistent with our hypotheses, Latino participants’ collective action scores were somewhat lower in the politicized law-framing conditions ($M = 2.72$), compared to the actual law condition ($M = 4.45$), $F(1,100) = 2.98, \ p < .10, \ \eta^2 = .03$. Moreover, Latino participants’ had somewhat higher collective action scores in the anti-law condition ($M = 3.74$), compared to the pro-law condition ($M = 1.69$), $F(1,100) = 3.12, \ p < .09, \ \eta^2 = .03$.

As a whole, these results provide strong support for our theoretical rationale. Recall that we hypothesized that Latino participants would become less motivated to engage in American behaviors when exposed to the politicized framings of SB 1070, compared to an actual passage from SB 1070, while the opposite pattern of effects would emerge for Black participants. Because the issues surrounding SB 1070 are, arguably, not particularly relevant to Asians, we hypothesized that their motivation to engage in American behaviors would not be affected.

When Latino participants were exposed to politicized portrayals of SB 1070, they showed less motivation to engage in all of the American behaviors, compared to when they saw an actual passage from the law. Thus, it may not be the legislation in and of itself that is threatening, but rather how the legislation is framed that matters. Contrary to our hypotheses however, seeing an approving portrayal of SB 1070, as opposed to a disapproving one, only exacerbated Latinos’ lack of motivation to engage in collective action, but not the other behaviors. The implications of these findings seem somewhat counterintuitive. After exposure to a law that is widely thought to threaten their group, Latinos become less motivated to want to evoke social change (e.g., by not wanting to vote or publicly protest). One might think that exposure to some injustice against their group would motivate Latinos to want to do something about it. However, consistent with prior work (Davies et al., 2002; Stone, 2002), the findings of the present research suggest that Latinos may psychologically disengage from America after exposure to SB 1070. In other words, when legislation implicitly treats their group as less American, Latinos may, in a way, begin to feel less American – perhaps feeling ostracized by their own country. This decrease in feeling American, we suggest, may then cause Latinos to embody the stereotype and become less motivated to actively participate in American society. Black participants, on the other hand, showed the reverse effect. For the most part, Black participants exhibited a slight increase in their motivation to engage in American behaviors after seeing a politicized passage about SB 1070, compared to an actual passage from the law. These results might also seem somewhat counterintuitive. One might think Blacks would feel threatened by a law that is widely thought to promote racial profiling. However, past research suggests that (Walton & Cohen, 2003), instead of feeling threatened by the supposed racial nature of SB 1070, Blacks may be relieved that their group is not targeted, leading to more engagement with America – perhaps implicitly reaffirming their American-ness. Also consistent with our hypotheses, Asian participants’ motivation to engage in any of the American behaviors was not particularly affected by the various framings of SB 1070. As our explicit American identity measure shows, Asian participants also did not strongly identify with being American, thus they may not have felt threatened by SB 1070, to the same extent that Latino and Black were.

Also, we posit that the controversial issues surrounding SB 1070 (i.e., racial profiling) are not relevant to Asians, in general. Moreover, though Asians have a history of being victimized by racial profiling in America in the past (i.e., during World War II), they currently hold a somewhat privileged status in society, relative to other minority groups, making certain threats to their group less psychologically impactful.

**Concluding Statements**

The fact that we found these effects with a sample of participants from all over America attests to the pervasive nature of the national news media in modern society. The present research suggests that SB 1070, legislation specific to the state of Arizona, psychologically impacted people from all over the country. Undoubtedly, the exhaustive media coverage of SB 1070 played a major role in making the law a nationally relevant issue. In the present research, we incorporated different framings of SB 1070 to mimic the different ways in which the news media typically covers stories – with a political slant. Unsurprisingly, we found that an approving portrayal of SB 1070 was psychologically harmful for Latinos. This makes sense, given that SB 1070 is widely thought to threaten their racial group. Interestingly though, a disapproving portrayal of the law also had harmful effects. Ironically,
coverage of this potentially racist law, that attempted to empathize with Latinos, might still have had harmful effects. Past research suggests that perspective taking (i.e., attempting to put one’s self in another’s shoes; Galinsky & Moskowitz, 2000) is widely thought to be an effective strategy for reducing prejudice and improving intergroup relations. However, by adamantly berating SB 1070, media outlets made clear who was targeted (Latinos), potentially producing the opposite of the intended effect – a harmful psychological effect on Latino viewers. The implications of the present study, regarding the psychological harm that exposure to SB 1070 may have on Latinos, are somewhat sobering. These findings suggest that being exposed to portrayals of SB 1070 that were commonly seen in the news may have caused Latinos to become less motivated to engage in certain actions that have the potential to improve their racial groups’ social status (e.g., voting in elections, contacting their congressperson if they have a concern, and participating in a protest demonstration). Given the implications of the present study, it seems pertinent to address the ways in which the national news media covers controversial issues so we, as a country, do not inadvertently alienate substantial portions of our population, potentially contributing to the maintenance of disparities that exist between racial groups in America.

References


McClelland, G. H. (2000). Nasty data: Unruly, ill-mannered observations can ruin your analysis. In H. T. Reis & C. M. Judd (Eds.), Handbook of research methods in social and personality psychology (pp. 393-411). New York: Cambridge University Press.


Footnotes

1. The data were collected from September 2010 to January 2011.

2. Residency, as a proxy for acculturation, had no bearing on any of the analyses (all Fs < 1.00) and thus are not discussed further.

3. Political affiliation and gender had no bearing on any of the analyses (all Fs < 1.00) and thus are not discussed further.

4. The degrees of freedom vary between dependent variables because we conducted outlier analyses, per dependent variable, and removed
participants if they had uncommon studentized deleted residuals for that specific variable. This approach allows us to test if an additional parameter is needed in the regression model in order to account for error in our predictions that is associated with a particular observation. Moreover, this index can be seen as an objective way to detect outliers given that it provides a $t$-value for each observation. Put simply, an uncommon studentized deleted residual indicates whether “an observation is so extreme that it is unlike the other observations” in the data set (Judd & McClelland, 1989, p. 221; McClelland, 2000).
A Longitudinal Investigation of Mattis Dementia Rating Scale Subscale Scores in Individuals with Manifest Huntington's Disease.

Daniel S. Brown

Abstract

The present study investigated longitudinal changes across a 3-year period in total Mattis Dementia Rating Scale (DRS) scores and individual subscale scores in 47 male (n=23) and female (n=24) patients diagnosed with manifest HD at baseline. Prior studies have reported that the DRS may be a useful tool for assessing cognitive dysfunction associated with Huntington's disease. However, longitudinal changes in DRS scores, and particularly DRS subscale scores, have not been adequately assessed in this population. Repeated measures analysis of variances were used to assess total DRS scores and DRS subscale scores obtained during a 3-year follow-up. The mean age of disease onset was 41.16 (SE=1.66) years of age and the mean age at initial testing was 47.04 (SE=1.60) years of age. Total DRS scores decreased significantly (p < .05) at the 3-year follow-up. Subscale scores significantly decreased at follow-up on the attention (p < .05), initiation/perseveration (p < .001), construction (p < .001), and memory (p < .05) subscales. However, statistically significant decreases on the conceptualization subscale were not detected (p = .09). The largest effect size was found for the initiation/perseveration subscale (.480) followed by the construction subscale (.351), the attention subscale (.094), and the memory subscale (.086). The effect size for the initiation/perseveration subscale (.480) was larger than the effect size for total DRS score (.431). The results demonstrate that total DRS scores for manifest HD patients decrease across a 3-year period. In addition, the largest decrease may occur on the initiation/perseveration subscale. Although additional research is needed with a larger sample, the results offer evidence that the initiation/perseveration subscale of the DRS may be implemented as a brief measure in clinical trials to track cognitive changes associated with HD over time.

Huntington’s Disease (HD) is an autosomal dominant, neurodegenerative subcortical brain disease. It is caused by an excess of the trinucleotide CAG repeat that occurs at the 4p16.3 chromosomal locus (Pirogovsky et al. 2009; Gisela et al. 1983; Anderson and Murder 2001). This CAG extension is believed to cause striatal atrophy stemming from volume loss in the basal ganglia, thereby affecting the frontostriatal circuit and thus, the frontal lobes (Pirogovsky et al. 2009).

The trinucleotide CAG normally repeats between 11 and 34 times. Patients with repeats over 37 times will develop the disorder (Grant, Adams, Brant and Butters 1996; Duyao et al. 1993). While it is not currently possible to accurately predict age of onset, patients diagnosed younger generally have longer CAG repeat lengths (Grant et al.; Duyao et al. 1993). Symptoms occur in the motor, cognitive and emotional domains. Although symptoms can develop at any age, they manifest at an average of age 40 (Grant et al.; Heathfield and McKenzie 1971; Bell 1934; Folstein, S., Brandt and Folstein, J. 1987) and death occurs an average of 15-17 years after onset (Grant et al.; Folstein 1989).

Cognitive symptoms include impairments in attention, language, spatial cognition, motor learning, executive control and emotional processing. Cognitive deficits are particularly noticeable in the areas of delayed recall, executive function, and memory acquisition. Language problems include impaired fluency, a decreased ability to rapidly generate words conforming to a rule as well as a loss of motor control that affects the ability to produce speech. HD patients tend to have difficulty solving spatial task problems even when controlling for the motor components of the task (Grant et al. 1996; Borkowski et al. 1967; Butters, Granola, Salmon, Grant and Wolfe 1987).

While the most trouble patients have with memory is retrieval (Anderson and Murder 2001), forming new episodic and semantic memories becomes problematic as well (Grant et al. 1996; Caine, Ebert and Weingartner 1977; Wilson et al. 1987). These issues can be revealed via word list and narrative learning problems. Motor learning issues are believed to be due to the affected Basal Ganglia. Noticeable executive control problems occur in selective working memory and attention. Therefore, HD patients generally show impairment on a number of neuropsychological tests.
Studies have revealed large differences between groups of HD participants and groups of normal participants on MMSE performance (Grant et al. 1996). Additionally, the Mattis Dementia Rating Scale (DRS or MDRS) has been used to assess differences between HD patients and patients with other types of dementia as discussed below. However, Grant et al note that literature on cognitive longitudinal studies of people with HD is very limited (Grant et al. 1996). The Mattis Dementia Rating Scale (DRS) is a neuropsychological test used to assess the severity level of dementia in cognitively impaired individuals. It measures five cognitive domains: attention, initiation and perseveration, construction, conception, and memory. Lezak notes that studies suggest that the interpretation of test scores should vary depending on age, education, and location of residence. Sex and race also affect test scores but not as greatly. DRS test-retest reliability is very high overall with the Initiation-Perseveration section being much lower (Lezak 2004).

Lezak also asserts that the DRS does well at differentiating Alzheimer’s Disease (AD) patients from normal controls. It also does well at differentiating mildly impaired patients from moderately impaired patients. Additionally, AD patients tend to do worse on the memory subscale than patients with subcortical diseases. Among the subcortical diseases, patients with Parkinson’s disease (PD) do worse on construction while patients with progressive supranuclear palsy or HD do worse on the initiation-perseveration subscale (Lezak 2004). Also, a study using the DRS to compare AD patients and dementia with Lewy Bodies patients found similar differences between HD and AD patients (Connor et al. 1998). Finally, a study using the DRS to compare normal controls to mild AD and HD patients could discriminate the normal controls from mild HD and AD but not HD from AD. Furthermore, it found the initiation/perseveration subscale to be the most useful and the construction subscale least useful (Mohr, Walker, Randolph, Sampson and Mendis 1996). However, a study published the year prior using the DRS to compare AD and HD patients, showed that HD patients perform worse on the initiation/perseveration subscale while AD patients showed worse impairment on the Memory subscale (Paulsen et al. 1995).

The present study assesses the relationship between DRS scores in HD patients over time. As people live longer and the prevalence of HD increases the need for brief cognitive measures that can effectively track change longitudinally increases. Not only could the DRS be useful in pinpointing manifest and preclinical disease progression but it could also be used in manifest and preclinical clinical HD trials. The hypothesis is that DRS overall and subscale scores will decline systematically over time.

**Method**

**Participants**

Forty-seven male (n =23) and female (n=24) patients diagnosed with manifest HD at baseline were administered the DRS and then again at a three year follow-up. The mean age of onset was 41.18 years, and the mean age at initial testing was 47.04 years.

The DRS assesses cognitive function in individuals with some level of dementia based on an overall score and five subscale scores. The DRS is based on a total of 144 points, with five subscales including attention (37 points), initiation and perseveration (37 points), construction (6 points), conceptualization (39 points) and memory (25 points). The test requires approximately 20 minutes to administer for non-demented and up to 45 minutes for demented individuals. For clinical purposes, it has been suggested that those who score 95 and above should get a full battery of tests, those who score 50-95 should get an abbreviated battery of tests called the “severe”
battery and those score 50 and below get an even more abbreviated version of tests (Coblentz et al. 1973). However, when interpreting DRS scores, the examiner must take cultural factors into account (Mattis 1976, Mattis 1986).

Coblentz et al. (1973) explain that according to the Alzheimer’s Disease Research Center (ADRC), normal skip-out rules are not followed when administering the DRS. Also, the examiner should attempt to help the patient achieve his best performance and in doing so, may rephrase or repeat instructions and offer some initial assistance when introducing each portion of the exam. However, the examiner may not repeat number sets on the Digit Span portion (tested within the Attention subscale). Furthermore, the patient may not view sentences to be memorized more than once (Coblentz, Mattis et al 1973). Results

Repeated measures analysis-of-variance (ANOVA) tests with time (baseline, 3-year follow-up) as a within group variable and DRS total score and subscale scores as the dependant variable. The analyses revealed significant decreases in total DRS scores \( F(1, 46) = 34.78, p < .001 \). In addition, the analyses revealed significant decreases in the following subscale scores: attention \( F(1, 46) = 34.78, p < .05 \), initiation and perseveration \( F(1, 46) = 42.51, p < .001 \), construction \( F(1, 46) = 24.86, p < .001 \), and memory \( F(1, 46) = 4.32, p < .05 \). However, significant decreases were not detected for the conceptualization subscale \( F(1, 46) = 2.95, p = .09 \). As shown in Figures 1 and 2, the total DRS scores and the attention, initiation and perseveration, construction and memory subscale scores decreased over time. Also, the effect sizes were calculated for the overall DRS scores and on subscale scores decreases using \( \eta^2 \). The \( \eta^2 \) were as follows: overall score = .43, attention subscale = .09, initiation and perseveration subscale = .48, construction subscale = .35, construction subscale = .35, conceptualization subscale = .06 and memory subscale = .07).

Discussion

The results revealed that DRS scores for manifest HD patients decreased across a 3-year period. Additionally, all subscale scores, with the exception of the conceptualization subscale, also decreased across a 3-year period. Effect sizes revealed that the initiation/perseveration subscale accounted for more variance than the other subscales and the total DRS scores. Given the importance of identifying brief measures of cognitive performance for use in clinical trials, the present study indicates that the DRS and particularly the initiation and perseveration subscale may be useful for tracking HD disease progression. It is important to note that the initiation and perseveration subscale primarily consist of verbal fluency-related tasks. This indicates that verbal fluency may be a particularly sensitive measure for tracking HD progression and possibly other subcortical disease progressions as well. This information may be especially useful to researchers developing new measures of cognitive performance for individuals with HD.

The ability to accurately track HD progression could be useful for medical professionals, caregivers and researchers. Of particular note are the implications that the DRS could be useful in assessing effectiveness of treatments during clinical drug trials. Also, a measure that creates a more accurate picture of HD progression allows medical professionals and caregivers to offer more accurate and therefore better treatment.

The various subcortical brain diseases are similar in many ways. Therefore, the initiation/perseveration subscale and total scores also could prove useful for longitudinally tracking the progression of other subcortical dementias that affect the frontal-striatal circuit. Future studies should investigate the effectiveness of using DRS scores for the longitudinal tracking other subcortical brain disease progression.

One limitation of the present study is the low number of participants. Additionally, there was no control comparison group. Therefore, future studies should include additional participants and a demographically matched control group as a means of comparison. Once a larger sample size and a control group are established, the total and initiation and perseveration subscale scores could be studied for effectiveness in tracking cognitive decline in preclinical gene carriers of HD as well. Identifying preclinical cognitive measure of HD could help immensely with early detection and early treatment. Furthermore, other cognitive neuropsychological tests such as the MoCA and Stroop test also could prove to be sensitive measures and should be evaluated longitudinally in people with HD. The results of the present study contribute to the overarching goal of properly assessing impairment in cognitive functioning associated with HD across time. In general, the present study can inform future studies and improve the assessment of longitudinal cognitive decline associated with the onset of manifest HD.
References


Vitamin D as a Potential Therapeutic for Behavioral Deficits Associated with Developmental Alcohol Exposure

Joe Happer

Abstract

Alcohol is a known teratogen which can cause widespread damage to the central nervous system, resulting in a wide array of cognitive and behavioral deficits. The range of effects is referred to by the umbrella term fetal alcohol spectrum disorders (FASD). In spite of precautions of alcohol’s harmful effects, some women continue to drink, making it necessary to find effective interventions to reduce the severity of FASD. The present study examines one such potential therapeutic: vitamin D. Chronic alcohol consumption is associated with decreased nutritional intake as well as decreased absorption. Animal studies have found that prenatal vitamin D deficiencies produce similar effects as those seen following developmental alcohol exposure. Thus, it was hypothesized that vitamin D supplementation might alleviate some FASD. This study used Sprague-Dawley rats randomly assigned to one of six treatment groups. Four groups were exposed to an ethanol dose of 5.25g/kg/day via intragastric intubations during the 3rd trimester equivalent, postnatal days (PD) 4-9; the other two groups were sham-intubated. From PD 2-30, ethanol-exposed subjects were subcutaneously injected with 0, 5, 10, or 15mg/kg/day vitamin D; sham-intubated subjects were treated with 0 or 15 mg/kg/day. On PD 30-33 subjects were tested in an automated open field. On PD 45-51, subjects were tested on a spatial learning task, the Morris water maze. Subjects exposed to ethanol exhibited increased locomotor activity in the center of the open field at the end of the session, an effect mitigated with vitamin D. However, no effects of either ethanol or vitamin D were evident during visuospatial testing. Importantly, the behavioral effects of vitamin D supplementation seen during activity testing were evident even though behavioral testing occurred after vitamin D treatment had ceased. Thus, vitamin D may be a potential treatment for some of developmental ethanol’s neurotoxic effects.

Alcohol consumption during pregnancy can lead to growth deficiencies, facial dysmorphology, and behavioral deficits due to damage to the developing central nervous system (CNS). Lemoine and colleagues (1968) in France were the first to describe these birth defects in the research literature. Later, Jones and Smith (Jones, Smith et al. 1973) documented the association between maternal alcohol consumption and this particular pattern of anomalies. Presented together, these abnormalities are characteristic of fetal alcohol syndrome (FAS), which is estimated to affect 0.5-3.1 children per 1000 live births in the United States (May and Gossage 2001).

Growth deficiencies and facial dysmorphology are the easiest signs of FAS to identify. Infants classified as having FAS exhibit low birth weights and length, deficiencies which never seem to “catch up” to those without FAS (Hoyme, May et al. 2005). The onset of the growth deficiencies is prenatal and continues into the postnatal period. Another salient feature of FAS is facial dysmorphology. An individual with FAS has at least three differentiating facial features, such as short palpebral fissures, a smooth philtrum, and a thin upper lip.

The most harmful impact of prenatal alcohol exposure is its devastating effects on the CNS, resulting in deficits in cognitive processes like learning and memory and a range of alterations in other behaviors including increased activity levels and motor incoordination (Mattson and Riley 1998). Children with FAS also perform poorly on IQ tests with scores averaging in the low 70s (Mattson and Riley 1998), making prenatal alcohol exposure the leading known preventable cause of mental retardation (Abel and Sokol 1987). Similarly, in an assessment of verbal learning and memory, children diagnosed with FAS showed significant impairments in both learning and recalling a word list (Mattson, Riley et al. 1996). Deficits in spatial learning (Uecker and Nadel 1996) and working memory (Kodituwakk, Handmaker et al. 1995) have likewise been found in children prenatally exposed to alcohol, implying damage to the hippocampus, prefrontal cortex, and potentially other regions as well. Executive functioning deficits in areas such as planning and response inhibition, abstract thinking, and flexibility are also seen in individuals prenatally exposed to alcohol (Mattson, Goodman et al. 1999).

Deficits in response inhibition may contribute to other behavioral effects of prenatal alcohol exposure (Riley, Barron et al. 1986). For example, individuals with FAS exhibit deficits in attention (Coles, Platzman et al. 2002; Mattson, Calarco et al. 2006), as attention deficit hyperactivity disorder (ADHD) is the most frequent comorbid diagnosis (Fryer, McGee et al. 2007).
Adolescents and adults with FAS have difficulties in tasks that require focusing, encoding, and shifting attention (Carmichael, Feldman et al. 1992). Increased activity levels have long since been recognized in the FAS population with individuals being described as tremulous, hyperactive, and irritable (Hanson, Jones et al. 1976). Furthermore, hyperactivity may be observed even without cognitive impairments (Shaywitz, Cohen et al. 1980). Animal experiments have frequently shown that developmental alcohol exposure increases activity levels (Thomas, Kelly et al. 1998; Gibson, Butters et al. 2000; Thomas, Fleming And et al. 2001; Thomas, Garrison et al. 2004; McGough, Thomas et al. 2009).

However, there is variability in the outcome of individuals exposed to alcohol prenatally. Factors such as the gestational timing of alcohol consumption, the dose, the frequency, and even the genetics of both the mother and fetus can all have an impact on the outcome and severity of alcohol’s damaging effects (Maier, Chen et al. 1996; Thomas, Kelly et al. 1998; Sulik 2005). Due to these differences, not all children born to mothers who have consumed alcohol will exhibit all of the features of FAS; rather, the effects of prenatal alcohol exposure may vary in severity. Thus, cases are referred to under the umbrella term fetal alcohol spectrum disorders (FASD), which includes individuals who do not meet the diagnostic criteria for FAS but exhibit damaging effects of prenatal alcohol exposure. Worldwide it is estimated that 1 in 100 live births show some adverse effects of prenatal alcohol exposure (Sampson, Streissguth et al. 1997).

Perhaps one of the most important factors in the severity of FASD is that of the mother’s nutritional status. Ensuring mothers consume adequate nutrition is difficult even during normal pregnancies, but alcoholic mothers, who may derive the majority of their caloric intake from alcohol, will have an even more difficult time. Animal studies have shown nutritional status can have a large impact on alcohol exposure to the fetus because undernourished mothers do not process alcohol efficiently, leaving the fetus exposed to its effects for a longer period of time (Shankar, Hidestrand et al. 2006). In addition, alcohol itself can interfere with the absorption of certain essential micronutrients, possibly worsening alcohol’s damaging effects. For example, in animal models of developmental alcohol exposure, zinc deficiency during gestation can exacerbate the risks for FASD (Miller, Del Villano et al. 1983) and, conversely, zinc supplementation decreases that risk (Summers, Rofe et al. 2009). Zinc supplementation administered just before (Carey, Coyle et al. 2003), as well as throughout (Summers, Henry et al. 2008), gestational alcohol exposure provides some protection from its teratogenicity. Similarly, Thomas and colleagues have repeatedly shown that neonatal supplementation of the essential nutrient choline ameliorates some of the detrimental effects of developmental alcohol exposure, reducing alcohol-related learning and memory deficits and hyperactivity (Thomas, La Fiette et al. 2000; Thomas, Garrison et al. 2004; Thomas, Biane et al. 2007; Thomas, Idrus et al. 2010). Supplementation of folic acid and vitamin B12 during gestational alcohol exposure can also significantly improve alcohol-related deficits in fetal body weight and length (Xu, Li et al. 2006). Nutrients that work as antioxidants have also been implicated as potential therapeutics (Mitchell, Paiva et al. 1999; Siler-Marsiglio, Pan et al. 2005; Ojeda, Nogales et al. 2009). Vitamin E, for example, can protect against both hippocampal (Marino, Aksenov et al. 2004) and cerebellar Purkinje (Heaton, Mitchell et al. 2000) cell loss. Nutritional interventions have great potential as interventions for FASD since they are relatively easy to administer, given that nutrients can be administered through supplementary vitamins or increased intake of foods containing the vitamins. Vitamin supplementation has relatively few drawbacks since a majority of vitamins have a relatively large window of safety and must be taken in extremely high doses before any toxic effects are produced. Given the potential benefits of dietary interventions for FASD, this study examined the effects of vitamin D supplementation.

Like many nutrients, the only source of vitamin D for the fetus is maternal, yet vitamin D intake is largely believed to be inadequate, especially in ethnic minorities (Hamilton, McNeil et al. 2010). Until recently, the recommended daily intake of vitamin D was 200 IU (international units) per day, an amount unsubstantiated by scientific support. Rather, it was based on how much vitamin D was believed to be in a teaspoon of cod liver oil which if taken daily was believed to prevent rickets (Hollis 2005). Recently, though, the recommended daily amount has been increased to 600 IU/day. However, some studies have shown that such an amount is still insufficient for adults, suggesting that the necessary intake may be on the order of 2000 IU/day (Hollis 2005).

Vitamin D is primarily gained by exposure to sunlight with minimal acquisition through diet as well. Ultraviolet light from the sun hits the skin, reacting with a precursor found in large quantities; this reaction results in cholecalciferol. This chemical must then undergo two hydroxylations, first in the liver to produce 25-hydroxycholecalciferol (25(OH)D), then in the kidneys, before it becomes the fully active form of vitamin D, 1,25-dihydroxycholecalciferol (1,25(OH)2D). This process can produce as much as 20,000 IU of cholecalciferol in 20 minutes of sunlight exposure for Caucasians (Hollis 2005), which is a far cry from the recommended 600 IU. Vitamin D levels can be estimated by assessing the amount of 25(OH)D.
circulating in the blood stream. Levels between 50-80 ng/mL are classified as “insufficient” while <50 ng/mL are “deficient” (Hollis 2005). Research suggests that even the recommended 600 IU/day is not enough to maintain healthy levels of circulating vitamin D. This is most concerning among pregnant women given that a recent study in sun-rich latitudes of the U.S. found 48% of pregnant women to be vitamin D deficient and an additional 37% insufficient (Hamilton, McNeil et al. 2010).

The role of vitamin D deficiency in hypocalcemia and rickets is fairly well understood and long established. Vitamin D regulates the absorption of calcium in the intestines, so if vitamin D levels are inadequate, then calcium concentrations begin to decrease and become insufficient. Calcium is essential for proper bone growth, thus if calcium concentrations are lacking, bones cannot properly calcify. Animal studies have shown that maternal alcohol consumption on its own can interfere with calcium levels in the fetus resulting in hypocalcemia (Keiver and Weinberg 2004). Furthermore, the same study suggested that the severity of the fetus’ hypocalcemia was related to its blood alcohol concentration (BAC)—that is, the higher the BAC, the worse the hypocalcemia. Keiver and colleagues also showed that skeletal ossification (bone tissue formation) of the fetus was impaired due to alcohol exposure (Keiver, Herbert et al. 1996). However, vitamin D affects not only development of bone, but development of the CNS as well.

One of the first observations of vitamin D’s influence on the developing CNS was its ability to increase nerve growth factor expression (Neveu, Naveilhan et al. 1994; Naveilhan, Neveu et al. 1996). More recent studies have shown that vitamin D has wide-ranging involvement in neuroprotection and production of various neurotrophins, neurotransmitters, and other proteins involved in brain growth (Garcion, Wion-Barbot et al. 2002; Almeras, Eyles et al. 2007; Eyles, Almeras et al. 2007). Similarly, animal models of gestational vitamin D deficiency show significant alterations in CNS development, producing offspring with enlarged ventricles, distortions in brain shape, reduced cell differentiation, and diminished expression of neurotrophic factors (Eyles, Brown et al. 2003; Feron, Burne et al. 2005; Eyles, Feron et al. 2009). Behavioral anomalies result from gestational vitamin D deficiency as well with hyperactivity and deficits in learning and memory seen in the offspring (Burne, Becker et al. 2004; Becker, Eyles et al. 2005). Many of these deficits associated with prenatal vitamin D deficiency are well-documented by-products of developmental alcohol exposure as well (Goodlett and Johnson 1997; Durrant and Riley 1998; Thomas, Kelly et al. 1998; Guerri, Bazinet et al. 2009). Newborns of alcoholic mothers revealed enlarged ventricles in autopsy studies (Clarren, Alvord et al. 1978) with similar effects demonstrated in animal models (Downing, Balderrama-Durbin et al. 2009). Furthermore, animal studies have modeled alcohol-induced behavioral alterations such as hyperactivity and motor incoordination as well as visuo-spatial and learning deficiencies, deficits also associated with FASD in humans (Clarren, Astley et al. 1992; Mattson, Riley et al. 1996; Thomas, Kelly et al. 1998; Spear-Smith, Brien et al. 2000; Riley and McGee 2005). The potential relationship with vitamin D is also particularly interesting given ethanol’s ability to impair neurotrophin production (Climent, Pascual et al. 2002). Administration of these growth factors can mitigate some of the alcohol-associated neuropathology (Barclay, Hallbergson et al. 2005) and behavioral deficits (McGough, Thomas et al. 2009). Furthermore, vitamin D itself has been shown to be neuroprotective against a variety of insults to the brain such as seizure (Tetich, Dziedzicka-Wasylewska et al. 2005), stroke (Wang, Chiang et al. 2000; Kajta, Makarewicz et al. 2009), glutamate-induced excitotoxicity (Ibi, Sawada et al. 2001; Atif, Sayeed et al. 2009; Kajta, Makarewicz et al. 2009), and oxidative stress (Chen et al. 2003; Ibi et al. 2001).

Alcohol’s teratogenic effects and interactions with nutrient absorption could combine with maternal vitamin D deficiency to exacerbate behavioral deficits associated with FASD. With both alcohol and vitamin D affecting brain development in potentially similar ways, a link is evident. This link, as well as evidence that vitamin D is neuroprotective, is the basis for the hypothesis that vitamin D supplementation before, during, and after alcohol exposure will ameliorate the behavioral deficits associated with developmental alcohol exposure.

2. Materials and Methods

All procedures included in this study were approved by the SDSU IACUC and are in accordance with the NIH Guide for Care and Use of Laboratory Animals.

2.1 Subjects

Subjects for this study were 133 Sprague-Dawley rats derived from the mating colony at San Diego State University’s Center for Behavioral Teratology. A male and female rat were housed together overnight and the presence of a seminal plug in the morning indicated successful mating and was recorded as gestational day (GD) 0. Females were then singly housed in a temperature- and humidity-controlled room and not disturbed except for routine maintenance. Animals were monitored until the expected day of delivery GD 22 (then recorded as postnatal day 0). The day after delivery, litters were pseudo-randomly culled
to 8 animals (4 sex pairs when possible), which was determined to be the optimal number (Light, Kane et al. 1998). All animals were kept on a 12-hour light/dark cycle receiving food (LabDiets© 5001, Richmond, IN, containing 4.5 IU/g vitamin D) and water ad libitum. Unless otherwise noted, all testing and procedures took place during the light cycle of the animals.

2.2 Treatment
To investigate the consequences of vitamin D supplementation on alcohol’s teratogenic effects, vitamin D was administered before, during, and after ethanol exposure during the 3rd trimester equivalent brain growth spurt. On postnatal day (PD) 2, pups were randomly assigned to one of six treatment groups: four ethanol-exposed (EtOH) and two control (Sham) groups. To control for litter effects, no more than one sex pair per litter was assigned to any one treatment group. Ethanol-exposed subjects were treated daily with a total of 5.25 g/kg/day from PD 4 through PD 9 via 2 intragastric intubation feedings 2 hours apart (followed by 2 milk feedings 2 hours thereafter). The time period, PD 4-9, in the rat is commonly accepted as a model of the 3rd trimester equivalent (Dobbing and Sands 1979). Intragastric intubations were the chosen administration route because it allows for control of alcohol exposure levels, producing the pattern of brain abnormalities associated with FASD (e.g., Serbus, Young et al. 1986; Light, Serbus et al. 1989; Pierce, Serbus et al. 1993), yet maintaining optimal growth (Light, Kane et al. 1998). Controls received sham intubations with no milk formula. All subjects received subcutaneous injections of vitamin D from PD 2-30. Injections were administered after the second ethanol intubation—therefore vitamin D was present during peak blood alcohol concentrations (Kelly, Bonthius et al. 1987). Three of the four ethanol-exposed groups and one of the sham control groups were injected daily with vitamin D3 (cholecalciferol, Sigma, USA). Cholecalciferol was used for its clinical relevance, as this is what is in dietary supplements. Also, injections were chosen so that doses could be accurately given relative to weight and were given subcutaneously since cholecalciferol is produced cutaneously. Three doses of Vitamin D were used: 5, 10, and 15 mg/kg (Csaba, Kovacs et al. 2007). One control group was given the highest dose of vitamin D. The remaining groups (ethanol-exposed and control) were injected with vehicle (saline and 5% peanut oil, 0 mg/kg vitamin D). Between treatments subjects remained with the lactating dam.

2.3 Blood collection
On PD 6, 1.5 hours after the second ethanol intubation, 20 μL of blood were collected from all pups via a tail clip for determination of peak blood alcohol concentrations (mg/dL). Blood samples were centrifuged and supernatant collected. Samples were analyzed using the Analox Alcohol Analyzer (Model AM1, Analox Instruments; Lunenberg, MA). Blood from controls was collected but not analyzed.

2.4 Behavioral testing
Beginning on PD 30 subjects underwent a battery of behavioral testing. The results of two of the five tests will be presented here.

2.4.1 Locomotor activity testing
On PD 30-33, subjects’ activity levels were measured for one hour each night. Activity levels were monitored in a Plexiglas open field (40 x 40 x 30.5 cm) within an optical beam activity monitor (Hamilton-Kinder, San Diego, CA). The open field was within an enclosed, ventilated chamber while white noise was played to mask any outside noises. Subjects were allowed to acclimate to the testing room for 30 minutes prior to the beginning of testing. Just before testing each subject, the open field was cleaned to eliminate any odor cues. The subject was then placed in the center of the open field and allowed to freely explore while beam breaks were recorded. A variety of measures were collected in 5-minute bins during the 60-minute test including total number of beam breaks, rearing, time spent in the center of the chamber, and distance traveled.

2.4.2 Morris water maze spatial learning
Beginning on PD 45, subjects were tested for 7 consecutive days on a spatial learning task, the Morris water maze (D’Hooge and De Deyn 2001). The test utilized a circular tank filled with water (26º C) made white by adding milk powder to conceal an escape platform (~10 cm diameter). The platform was hidden 1 to 1.5 cm below the surface of the water. The testing room had various extramaze spatial cues for the subjects to use to find the location of the platform (e.g., posters, curtains, signs).

The first 6 days consisted of acquisition training where the subject was required to find the location of the platform using extramaze cues. During this phase, a subject was placed in the tank and allowed to swim for up to 60 seconds or until the platform was found. The platform’s location for each individual subject was initially randomly chosen from one of four possible locations (one in each quadrant) and remained stationary for the duration of the acquisition phase. Each subject was tested for 4 trials/day with an intertrial interval (ITI) of 3-5 minutes. A trial was initiated by placing the subject in the water facing the rim of the tank and then allowing to swim freely to locate the platform. The starting position varied between trials to prevent the learning of motor patterns. When the
platform was reached, the subject was given 10 seconds
to observe and learn the spatial cues around the room.
After 10 seconds the subject was removed from the
platform and placed in a heated cage (31º C) to prevent
hypothermia.

Before each day’s testing began, subjects’
heads were marked black so their swimming could be
tracked via an overhead video camera (HVS Image,
2020 Software). Distance swum to find the platform,
latency to find the platform, heading angle compared to
the location of the platform, and swimming speed were
recorded. On the 7th day of testing, subjects underwent
a probe test to assess memory of the platform location.
The platform was removed and a subject was allowed to
swim freely for 60 seconds. The percent of time spent
near the target area and the number of passes through
the previous target’s area were recorded.

Finally, to determine if there were group
differences in performance measures such as swimming
ability or motivation, subjects were tested with a visible
platform for 2 days with 4 trials/day on PD 60. The
water level was lowered so that the platform was visible
as well as marked for visibility. The platform moved
between quadrants between trials so that spatial location
was not associated with escape. All spatial cues were
eliminated in the room by covering them with a white
curtain. Distance and latency taken to swim to the
platform, swimming speed, and initial heading angle
were measured.

2.4.4 Analysis

All data were analyzed using SPSS software.
Data were analyzed using ANOVAs with treatment and
sex as between-subjects factors. Treatment groups will
be referred to by ethanol treatment (EtOH or Sham) plus
vitamin D received (e.g., EtOH + 0, EtOH + 5, Sham +
15, etc.). Activity data were measured with day (4) and
5-minute bin (12) as repeated, within-subject variables.
The data collected from the Morris water maze
acquisition phase and visible platform were analyzed
with day and trial as repeated, within-subject vari a bles.
Post hoc comparisons were conducted with Fisher’s
Least Significant Difference (p’s < .05).

3. Results

3.1 Blood alcohol concentration

Blood alcohol concentrations were around 350
mg/dl across all ethanol-exposed groups (see Figure 1).
Unfortunately, many blood samples were lost because
the samples were frozen too long resulting in
insufficient plasma amounts for analysis (EtOH + 0 lost
6, EtOH + 5 lost 12, EtOH + 10 lost 6, and EtOH + 15
lost 3). No significant differences between sexes
[F(1,45) = .21, p = .7] or treatment groups were found
[F(3,45) = .35, p = .8], indicating that administration of
vitamin D had no effect on peak BAC. Comparable
blood alcohol concentrations have been observed in
clinical populations (Silva, Miller et al. 1987; Tsai,
Williams et al. 2008) as well as animal models using a
similar protocol (Bonthius and West 1988; Ryan,
Williams et al. 2008).

3.2 Locomotor activity

Ethanol exposure increased locomotor activity
on a variety of measures (e.g. total distance, basic
movement, and center entries). For example, total
distance traveled is shown in Figure 2. Locomotor
activity declined over time producing significant effects
of day [F(3,363) = 19.4, p < .001], bin [F(11,1331) =
833.7, p < .001], and an interaction of day by bin
[F(33,3993) = 33.3, p < .001]. During the end of the
sessions (last 4 bins), the EtOH + 0 group traveled
significantly larger distances than the Sham + 0 group
producing a bin by treatment interaction [F(55,1331) =
1.6, p < .01]. Although vitamin D reduced this alcohol-
related overactivity, there were no statistically
significant differences among the ethanol-exposed
groups.

Interestingly, for the distance traveled in the
center of the activity chamber (Figure 3), there was
trend for a bin by treatment interaction [F(55,1331) =
1.3, p = .08]. Further analyses showed that again during
the end of the session, the EtOH + 0 group was traveling
significantly larger distances in the center compared to
the Sham + 0 group. This effect was attenuated by
administration of vitamin D with the ethanol-exposed
group treated with 5 mg/kg of vitamin D significantly
less active than the EtOH + 0 group (p < .05). A similar
pattern was observed in distance traveled in the
periphery (data not shown).

A similar increase in exploratory behavior
resulting from ethanol exposure was observed, as
indicated by the number of times subjects reared on
their hind legs (see Figure 4). A significant effect of bin
[F(11,1331) = 618.8, p < .001], day [F(3,363) = 47.3, p
< .001], and day by bin [F(33,3993) = 33.3, p < .001]
were found, as rearing behavior declined within and
between sessions. EtOH + 0 subjects exhibited more rearing at the end of the session compared to the Sham + 0 group producing a significant bin by treatment interaction \( F(55,1331) = 1.5, p < .05 \). Although all doses of vitamin D reduced this alcohol-related increase in rearing behavior, effects were not statistically significant (all \( p \)'s > .05). Importantly, activity levels of ethanol-exposed subjects treated with any dose of vitamin D did not differ significantly from that of controls on any activity measures.

It should be noted that administration of 15 mg/kg of vitamin D to the control group tended to increase activity on a variety of measures. However, performance of this group did not significantly differ from that of the Sham + 0 group (all \( p \)'s > .1).

Panel A shows the total distance traveled per 5-minute bin collapsed across days, where there was a significant bin x treatment effect. During the end of session (Panel B), EtOH + 0 subjects were more active than the Sham + 0 group. There was a trend for vitamin D to attenuate the alcohol-related overactivity. * = significantly different from Sham + 0.

During the end of the session, the EtOH + 0 group was significantly more active, as indicated by traveling larger distances than the Sham + 0 group (Panel B). This effect was significantly attenuated by supplementation of 5 mg/kg of vitamin D.

** = significantly different from Sham + 0 and EtOH + 5
Panel A shows the average number of times subjects reared during 5-minute bins collapsed across days for the one hour testing sessions. During the end of the session (last 4 bins), EtOH + 0 subjects reared more than the Sham + 0 group (Panel B), illustrating an increase in exploratory behavior. Vitamin D tended to decrease * = significantly different from Sham+0

3.3 Morris water maze

Morris water maze performance is shown in Figure 5. Analysis of the path length to find the platform showed significant effects of day \( F(5,605) = 206.4, p < .001 \), trial \( F(3,363) = 57.0, p < .001 \), and a day by trial interaction \( F(15,1815) = 4.36, p < .001 \). This indicates that all groups were able to learn the task as the distance taken to find the escape platform decreased over training. There was a tendency for ethanol-exposed subjects to take longer path lengths to find the escape platform; however, this failed to reach statistical significance \( F(5,121) = 2.0, p < .1 \). Finally, vitamin D supplementation was not shown to have any effects on either EtOH groups or controls.

Heading angle is the degree to which the subject’s chosen path differs from a direct path to the escape platform, so the greater the heading angle, the worse the precision of swimming direction. Performance improved for all groups over testing days, resulting in significant effects of day \( F(5,605) = 46.8, p < .001 \) as well as trial \( F(3,363) = 6.23, p < .001 \) (see Figure 6). There was also an effect of treatment \( F(5,121) = 2.9, p < .05 \). The EtOH + 0 group did not significantly differ from the control groups. However, the EtOH + 5 group had a significantly larger heading angle than the Sham + 0 (\( p < .05 \)) group, and the EtOH + 10 group had larger heading angles than the EtOH + 0, Sham + 0, and Sham + 15 groups (\( p’s < .05 \)).

In the test for spatial memory (probe), neither ethanol exposure nor vitamin D treatment had an effect on the number of passes through the target area \( F(5,121) = 1.46, p = .21 \) or the percentage of time spent in the target area \( F(5,121) = 3.44, p = .22 \), as all groups performed similarly (see Figure 7). These results indicate that neither ethanol exposure nor vitamin D treatment significantly affected spatial memory.

Finally, neither ethanol exposure nor vitamin D supplementation had an effect on swimming speed during acquisition \( F(5,121) = 0.35, p = .88 \), indicating that there were no differences in motor abilities. Moreover, there were no effects of treatment on the visible platform version of the Morris water maze (data not shown), indicating that there were no differences in motivation, sensory processing, or other factors that might influence performance.
Figure 5. Morris Water Maze: Path Length
Panel A shows that all groups improved over the course of training, with Panel B showing the path length collapsed across training days.

The heading angle refers to the difference between the initial swimming direction and the location of the escape platform. Performance of all groups improved over the course of training, as can be seen in Panel A. However, the ethanol-exposed groups treated with either 5 or 10 mg/kg vitamin D were significantly less accurate in their swimming direction (Panel B). * = significantly different from Sham + 0, ** = significantly different from EtOH + 0, Sham + 0, and Sham + 15.

Figure 6. Morris Water Maze: Heading Angle

During the test for spatial memory, neither alcohol nor vitamin D was shown to have an effect on either the number of passes through the target (Panel A) or the percentage of time spent in the target area (Panel B).

4. Discussion
The present study is the first to our knowledge to explore vitamin D as a potential therapeutic for behavioral deficits associated with FASD. Our study has confirmed that ethanol exposure during the third trimester equivalent can produce behavioral deficits in a rat model of FASD, such as increased activity levels, a behavior consistently observed in children prenatally exposed to alcohol (Hanson et al. 1976; Coles et al. 2002; Mattson et al. 2006). We found subtle differences in activity levels between ethanol-exposed subjects and sham subjects not supplemented with vitamin D, with ethanol-exposed subjects being more active on a variety of measures. Vitamin D supplementation was shown to decrease ethanol-related overactivity when administered before, during, and after ethanol exposure.

Contrary to previous research, our study failed to show strong ethanol-related visuospatial deficits on the Morris water maze task. There were no differences between treatment groups on path length taken during the training trial, as well as no significant deficits in spatial memory, as measured during the probe trial. The
only instance in which there were differences between treatment groups was on the heading angle during the acquisition phase, with the ethanol-exposed groups treated with 5 or 10 mg/kg/day vitamin D exhibiting less precise swimming direction. Although this might suggest that vitamin D impaired their performance, given that they did not differ in path length during acquisition, or in spatial memory measures, it is more likely that these differences represent varied search pattern behaviors. Consistent with this interpretation, subjects in these groups exhibited different search strategies on a working memory task without exhibiting deficits in working memory (data not presented here). Together, these data suggest that vitamin D may have some effects on behavioral aspects that were not directly measured in the present study.

Interestingly, developmental ethanol exposure failed to impair spatial learning despite peak blood alcohol concentrations being around 300 mg/dL, which in previous studies from our lab were sufficient to result in significant deficits (Thomas, Biane et al. 2007; Ryan, Williams et al. 2008; McGough, Thomas et al. 2009). It is not clear why ethanol-related alterations were not observed in the present study; however, there are inconsistent results within the literature. For example, many studies have shown ethanol-induced impairments in both sexes (Goodlett, Kelly et al. 1987; Reyes, Wolfe et al. 1989; Gianoulakis 1990) whereas others have shown deficits in only males (Zimmerberg, Sukel et al. 1991) or only females (Blanchard, Riley et al. 1987; Kelly, Goodlett et al. 1988). These differences may have resulted due to variations in ethanol exposure procedure. Cronise et al. (2001) contend that the timing of ethanol exposure may be critical in the effects of developmental alcohol exposure on spatial learning. They showed spatial learning deficits resulting only from a prolonged period of time (gestational day (GD) 1 to postnatal day (PD) 10), with no deficits from short-term exposure (PD 2-10) (Cronise, Marino et al. 2001). Interestingly, the same short-term alcohol exposure can reduce the number of cells in a region of the hippocampus, a brain structure associated with learning and memory, compared to controls at a level similar to that following more long-term alcohol exposure (Tran and Kelly 2003). This would suggest that the decrease in hippocampal cell number is necessary but not sufficient to cause impairment. Moreover, given that more regions than just the hippocampus are involved in the Morris water maze task, such as the prefrontal and entorhinal cortices, prolonged ethanol exposure may be damaging these regions whereas short-term exposure may not.

Since ethanol did not impair spatial learning performance or spatial memory, it was not possible to determine if vitamin D can attenuate ethanol’s effects on cognition. Nevertheless, the effects of vitamin D on activity levels suggest that it can reduce alcohol’s effects on at least some behaviors. Recent hypotheses have suggested that abnormal neurogenesis and neuronal migration could play a role in hyperactivity and attention deficits (Kent, Green et al. 2005; Syed, Dudbridge et al. 2007), particularly dysfunction in neuronal connections between particular brain regions such as the medial prefrontal cortex or parietal cortex (see Konrad and Eickhoff 2010 for review). Similar neuronal changes resulting from developmental alcohol exposure have been observed (Klintsova, Helfer et al. 2007; Kim, Go et al. 2010; Gil-Mohapel, Boehme et al. 2011). For example, transforming growth factor β (TGFβ) is critical for cortical development in such instances as migration of young neurons in the fetus and cell proliferation and differentiation (for review see Cameron, Hazel et al. 1998). However, TGFβ’s signaling pathways can be disrupted by alcohol as seen if administered to neurons in vitro as a model of fetal alcohol exposure (Powrozek and Miller 2009). Interestingly, adult multiple sclerosis patients that received vitamin D supplementation for 6 months show increases in TGFβ levels proportional to vitamin D levels (Mahon, Wittke et al. 2003). Likewise, animal research has suggested that 1,25(OH)2D (the active form of vitamin D) may increase the production and positively regulate the expression of TGFβ (Cantorna, Woodward et al. 1998). Furthermore, vitamin D itself plays a role in neuronal development, such as proliferation and differentiation (Garcion, Wion-Barbot et al. 2002; Almeras, Eyles et al. 2007; Eyles, Almeras et al. 2007). Both of these factors suggest that vitamin D supplementation may be improving the atypical brain development that results from ethanol exposure, thereby influencing the expression of neurobehavioral deficits such as reducing alcohol-induced overactivity.

Indeed, vitamin D has also been shown to be a potential neuroprotective agent. Kajta et al. (2009) showed that 1,25(OH)2D reduced excitotoxic cell death of hippocampal neurons exposed to high levels of glutamate in vitro. Furthermore, they demonstrated that 1,25(OH)2D still attenuated damage even if administered several hours after the introduction of glutamate. This is of interest given that alcohol can induce N-methyl-D-aspartate (NMDA) receptor-mediated excitotoxicity during periods of alcohol withdrawal and may be a mechanism by which alcohol causes neuronal death during development (for review see Littleton 1998). Moreover, vitamin D has anti-apoptotic properties, as has been shown by its inhibition of caspase-3, a protein necessary for apoptotic cell death (Kajta et al. 2009). A potential mechanism of vitamin D may therefore be taking place during this withdrawal phase that follows alcohol exposure and future studies may explore the neuroprotective effects of vitamin D by
investigating cell counts in the hippocampus and other brain areas.

Importantly, vitamin D did not influence peak blood alcohol concentration, indicating that its beneficial effects were not simply due to altered alcohol exposure. However, even though vitamin D supplementation did not affect peak blood alcohol concentrations, the converse is very likely to be true. Previous research suggests that alcohol consumption can affect levels of 1,25(OH)2D while not affecting levels of 25(OH)D (the inactive form of vitamin D) (Shankar et al. 2006). The underlying mechanisms for this have not been fully explored. Some studies suggest alcohol could potentially be inhibiting the enzyme responsible for converting 25(OH)D to 1,25(OH)2D (Kent et al. 1979). Alternatively, alcohol may be increasing degradation of 1,25(OH)2D by increased activation of the responsible enzyme (CYP24A1) found in the kidneys. In fact, ethanol exposure can increase CYP24A1 induction which corresponds to decreases in 1,25(OH)2D levels (Shankar et al. 2008). Though the Shankar study was focused on degradation of vitamin D, it did show minor inhibition of the enzyme responsible for synthesis of 1,25(OH)2D. In terms of vitamin D supplementation, this would imply that vitamin D, as the metabolite necessary for proper brain development, would be reduced both by inhibition of production as well as increased degradation as a result of increases in CYP24A1. It should be noted, though, that these studies were conducted using adult animals. Nevertheless, rats prenatally exposed to alcohol cannot efficiently synthesize vitamin D into 25(OH)D (Milne and Baran 1985), so some of the same mechanisms may be occurring during developmental alcohol exposure. Unfortunately, this study did not measure any vitamin D metabolite levels, but future studies should determine how developmental alcohol affects vitamin D levels.

In light of the previous research, one would expect vitamin D supplementation to be ineffective in combination with alcohol. In this instance, however, timing of vitamin D administration may be critical. With alcohol’s potential to simultaneously block synthesis and increase degradation of vitamin D, storing vitamin D for later use may be crucial. In an effort to increase vitamin D levels, vitamin D-deficient adult rats that were exposed to ultraviolet radiation for prolonged periods exhibited long-lasting increases in blood plasma levels of cholecalciferol (vitamin D3) while showing a high capacity for storage in the plasma as well as in various tissues (Lawson et al. 1986). Similarly, adult men given an oral supplement of vitamin D for several weeks exhibited an increase in levels of vitamin D as well as 25(OH)D even after cessation of treatment. Furthermore, cholecalciferol has been identified as the primary form that is stored in adipose tissue in both rats and humans with the assumption that it would be converted in times of deprivation (Rosenstreich et al. 1971; Mawer et al. 1972). Interestingly, rats that were supplemented with vitamin D and subsequently had a period of fasting had higher levels of 25(OH)D compared to non-fasting rats, suggesting that fasting rats were able to mobilize stored vitamin D from adipose tissue (Brouwer et al. 1998). This suggests that vitamin D supplementation may have a lasting impact on its availability for later use, even if synthesis of either metabolite is impaired during periods of ethanol intoxication. Additionally, it has not been established what effect alcohol may be having on the ability to store vitamin D in adipose tissue or other storage sites in the body in the adult, let alone the developing fetus. Thus alcohol could potentially be inhibiting the body’s ability to store vitamin D in tissue, but vitamin D supplementation may combat this. Future studies may investigate what effect alcohol has on the storage of vitamin D by sampling tissue from adipose tissue as well as various other sites in the body.

Our study suggests that vitamin D supplementation has the potential to be a therapeutic intervention for some FASD. Moreover, given vitamin D’s pervasive involvement in brain development, and having been suggested to have effects across the entire body, it warrants particular attention. Yet future research is needed to establish the most effective level of vitamin D, to establish if there is a critical time period for administration, and to verify that it is safe to administer. In addition to providing potential means to alleviate alcohol-induced deficits, it would also give insight into how alcohol’s teratogenic effects are achieved. Though this study is just one dietary supplement, it underscores the fact that dietary interventions have great potential in aiding those with fetal alcohol spectrum disorders.

References


Brief Report: Could sensory symptoms in ASD be overreported by caretakers? A comparison of two versions of the Sensory Profile

Francisco Velasquez

Abstract

Atypical responses to sensory stimuli are frequently seen in individuals with Autism Spectrum Disorders (ASD), implying that sensory information may be processed abnormally. Such atypical responses can be detected using the Sensory Profile, an instrument often used to measure sensory sensitivity. Our objective was to test for differences between sensory perception assessment of caregivers and the self-assessment of participants with ASD and also to compare the ASD results with those for a typically developing (TD) cohort. Data obtained from a sample of fifteen individuals with ASD and their caregivers showed that caregivers attributed significantly more sensory symptoms to their children with ASD than these reported for themselves. TD caregivers reported fewer sensory symptoms than TD adolescents, on average. Our findings suggest inconsistencies in reporting of sensory symptoms between children with ASD and their caregivers.

Key Words: sensory processing, Sensory Profile, ASD, self-report, caregiver, symptoms.

Autism Spectrum Disorders (ASD) are a set of pervasive developmental disorders that affect social interaction, communication and interests (American Psychiatric Association [APA], 1994). The etiology of ASD is unknown and the only currently accepted diagnosis is therefore through observation and behavioral report (Filipek et al., 1999; Leonard et al., 2010). A characteristic of these disorders that can affect accurate diagnosis is their heterogeneous nature with symptoms varying substantially across individuals. However, many symptoms are prevalent in ASD and the manifestation of these, in individuals yet to be diagnosed, may indicate a need for further evaluation. An example of such prevalent symptoms are the atypical responses to sensory stimuli which are frequently seen in children with ASD (Kern et al., 2006; Tomchek and Dunn, 2007). Kern and colleagues (2006) studied the sensory perception of more than 100 individuals with ASD and assured significant sensory abnormalities in auditory, visual, oral, and tactile processing. Tomchek and Dunn (2007) found similar results in a sample that included children ages three to six years diagnosed with autism. These abnormal responses to specific stimuli are used in ASD assessment for the area of restricted, repetitive behaviors and interests (Lord, Rutter & LeCouteur, 1994).

Atypical responses related to sensory processing can be detected using the Sensory Profile (SP, Dunn, 1999) and the Adolescent/Adult Sensory Profile (AASP; Brown and Dunn, 2002), instruments often used in ASD and ADHD to measure sensory sensitivity. These instruments were created to measure sensory processing based on everyday experiences. Behavioral reports of individuals with ASD usually come from parents and other caregivers or from clinical observation, but can also be self-reported. The SP instruments provide the opportunity to assess sensory perception using information that comes from caregivers and from self-report. Since accurate measurement of sensory perception is relevant in view of known sensory abnormalities in ASD, a comparison of results obtained from the two versions of the SP can provide important insight. The reliability of clinical instruments and self-reports plays a critical role in clinical and behavioral assessment. Past research has highlighted concerns with self-report related to measurement error and biased response (Baldwin, 2000). In addition to this, impaired self-awareness has been associated with ASD (Johnson, Filliter & Murphy, 2009). Biases from either caregivers or individuals with ASD may lead to inaccurate responses and consequently, unreliable data.

Our objective was to test for differences between sensory perception assessment by caregivers and self-assessment by participants with ASD. Previous ASD studies have shown inconsistencies between self and parent assessments. Johnson et al. (2009) compared the differences between the assessment of caregivers and individuals with ASD on Autism Spectrum, Empathy, and Systemizing Quotients. It was found that individuals with ASD reported having fewer autistic traits and more empathic features than were attributed to them by caregivers (Johnson et al. 2009). Considering the possible biases and the results of previous research, we hypothesized that SP responses would show discrepancies based on assessment source. To further understand the relationship between self-report and caregiver assessment using the SP, we also tested for
differences in sensory perception reports between typically developing (TD) individuals and their caregivers. It was hypothesized that differences in the assessment of sensory responses would be greater between adolescents with ASD and their caregivers compared to TD adolescents and their caregivers.

**Method**

**Participants**

Twenty-two adolescents with ASD (Mean age=13.3, SD=2.63; non-verbal IQ =110.3, SD=15.1) and their respective caregivers were recruited through Dr. Alan Lincoln, director of the Center of Autism Research, Evaluation and Service (CARES). Diagnosis was determined based on DSM-IV (APA, 1994), the Autism Diagnostic Interview-Revised (ADI-R; Lord, Rutter & Couteur, 1994) and the Autism Diagnostic Observation Schedule (ADOS; Lord et al. 2000). Twenty TD individuals (Mean age= 13.1, SD=2.35; non-verbal IQ = 110.15, SD=12.5) and their caregivers were also given the SP as part of a neuropsychological battery of tests.

**Procedure**

There are two versions of this instrument: (i) an assessment completed by caregivers of individuals with these disorders (Dunn’s Sensory Profile <CIT>); and (ii) the Adolescent/Adult SP <CIT> created for self-assessment and composed of an entirely different set of questions than the ones used in the caregiver version. Caregivers for both ASD and TD samples were asked to complete the SP questionnaire during the consent process after adequate instructions or were given the questionnaire through mail along with complete instructions. In addition, participants with ASD and TD adolescents answered the Adolescent/Adult Sensory Profile. After they had received thorough instructions, the questionnaire was either self-administered or read aloud and marked by a trained lab member who also provided assistance in item comprehension when necessary.

<table>
<thead>
<tr>
<th>TD Participant characteristics</th>
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<td><strong>TD (n = 20)</strong></td>
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<td><strong>M</strong></td>
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<tr>
<td><strong>Age</strong></td>
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<td><strong>Verbal IQ</strong></td>
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<td><strong>Non-verbal IQ</strong></td>
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<td><strong>Full- Scale IQ</strong></td>
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<tr>
<th>ASD Participant characteristics</th>
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<tr>
<td><strong>ASD (n = 22)</strong></td>
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<td><strong>M</strong></td>
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<tr>
<td><strong>Age</strong></td>
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<tr>
<td><strong>Verbal IQ</strong></td>
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<td><strong>Non-verbal IQ</strong></td>
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<td><strong>Full- Scale IQ</strong></td>
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Responses to both versions of the SP can be broken down into quadrants for interpretation. Each quadrant is composed of a sensory processing pattern: low registration, sensation seeking, sensitivity, and avoiding. The raw scores for each quadrant were converted to z-scores using published standardized scores from the SP manuals. A Wilcoxon Signed-Ranks test was used to compare adolescent z-scores with caregiver z-scores for both ASD and TD samples. Correlations between the self-report and caregiver report for both versions of the SP were also analyzed. A paired sample t-test was used between groups to compare ASD adolescent quadrant z-scores with those of TD adolescents and also to compare the quadrant z-scores of ASD caregivers to those of TD caregivers.

**Results**

We found significant differences on all four quadrants between the two versions of the SP administered to adolescents with ASD and their caregivers. A Wilcoxon Signed-ranks test indicated that caregivers of individuals with ASD reported more sensory symptoms (Mdn = 4.17) than adolescents with ASD (Mdn = .388), in the low registration quadrant Z = 3.295, p = .001, the sensation seeking quadrant
We also performed Pearson correlation analyses between adolescent self-report and caregiver report on both ASD and TD groups. In the ASD group, a significant negative correlation for the “Sensation Seeking” quadrant, \( r(44) = -.499, p = .018 \), and a marginally significant positive correlation in the “Sensation Avoiding” quadrant, \( r(44)= .395, p = .069 \), were detected. In the TD group, a significant negative correlation was found for the “Sensation Seeking” quadrant, \( r(40) = -.584, p = .007 \).

**Discussion**

As was expected, the adolescents with ASD showed overall significantly more sensory abnormalities than matched TD participants. However, this expected finding was only fully replicated when using the caregiver SP <CIT>. Our findings further support the hypothesis that caregivers tend to report more sensory symptoms for their children than individuals with ASD attribute to themselves. For all quadrants of the SP, caregivers reported more sensory behaviors for their children than those reported for themselves on the AASP <CIT>.

We had further hypothesized that greater differences would be found between caregiver reports and adolescent self-reports in the ASD compared to the TD group. This hypothesis was supported by our results. We found significant differences in all four quadrants between adolescent and caregiver versions in the ASD group, no significant differences in the TD group.

Inconsistencies between caregiver assessment and self-assessment would need to be taken into account when applying results from the SP in behavioral or neuropsychological research. We were also unable to detect significant correlations between reports from the two versions. In fact, scores were negatively correlated for the sensation seeking quadrant in both TD and ASD groups. These findings suggest that caution is required when assessing sensory behaviors in ASD based on the Sensory Profiles. Our study could not determine whether the inconsistencies found were due to overreporting of sensory symptoms by caregivers or underreporting by ASD participants. However, the fact that sensory abnormalities reported in previous studies of ASD could only be replicated by means of the caregiver version suggests that this version may have greater validity.

The results of this study highlight a discrepancy between two sensory symptom reports that should significantly correlate and validate each other. Since the data obtained from these instruments relate to a domain of common impairment in ASD, which may affect strategies of intervention, the use of unreliable reports could be extremely detrimental. However, sample size in the current study was modest and it would be important to replicate results in a larger cohort.
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Author Note
F. Velasquez
Department of Psychology, San Diego State University
Brain Development Imaging Laboratory, 6363 Alvarado Court, Suite 225, San Diego, CA 92120
e-mail: fvelasqu@rohan.sdsu.edu
HIV-Associated Deficits in Visuospatial Temporal Order Memory

Calhuei Hoebel

Abstract

The frontal lobes have been shown to be important for accurate temporal order memory. Since frontostriatal circuit dysfunction and episodic memory deficits are characteristics of HIV infection, temporal order memory may be sensitive to neuropathological changes in individuals living with HIV. Disruption of temporal order memory may impair cognitive processes that are critical to the execution of daily living skills. In the present study, 38 individuals with HIV and 31 demographically similar seronegative persons were administered a visuospatial temporal order memory task on a computerized radial 8-arm maze. On the sample phase of each trial, the participant was shown a random sequence of circles presented one at a time at the end of each of the eight arms. On the choice phase, the participant was presented with a circle at the end of two of the sample phase arms and was asked to choose the circle that occurred earlier in the sequence. Manipulations of temporal interference were carried out by systematically changing the temporal separation lag, defined as the number of circles that occurred during the sample phase sequence between the two choice phase circles. The performance of both groups increased as a function of increased temporal separation lag. However, individuals with HIV demonstrated significant impairments relative to seronegative persons across lags. These results suggest that temporal order memory may be impaired in individuals with HIV. Research examining the cognitive and neural mechanisms of HIV-associated impairment in temporal order memory may elucidate a fundamental deficit that could potentially inform behavioral interventions that structure daily living tasks to mitigate temporal interference.

Neuropathological Dysfunction

The human immunodeficiency virus (HIV) is associated with changes in executive function, attention, information processing speed, motor function, and episodic memory (Cherner et al., 2004; Sacktor et al., 2007; Woods et al., 2010). In general, it is believed that one-half to one-third of individuals who are living with HIV (seropositive) are affected by a neurocognitive deficit, while one-half to two-thirds do not display deficits that interfere with instrumental activities of daily living (IADLs) (e.g., Antinori et al., 2007; Grant et al., 2005; Woods et al., 2009). HIV-associated neurocognitive deficits (HAND), are diagnosed in HIV-infected individuals who show impairments in two or more cognitive domains: executive function, episodic memory, information processing speed, motor skills, attention/working memory, language, sensori-perception from a performance-based neurocognitive test battery (Woods et al., 2009). Given the extent to which the HIV virus compromises cognition, it is not surprising that a review of the autopsy results of HIV-infected individuals indicate that the brain is the organ most infected by the virus other than the lungs (Masilah et al., 2000). Although HIV does not directly infect neurons, it penetrates the blood brain barrier and replicates in perivascular macrophages and microglia (Hult et al., 2008; Woods et al., 2009), which broadly compromises the immune response of the central nervous system (CNS).

Vulnerability of the Frontostriatal Circuits

Studies using magnetic resonance imaging (MRI) found that some HIV-infected adults without CNS opportunistic infection showed white matter hyperintensities, enlarged ventricles, and enlarged subarachnoid spaces (e.g. Dal Pan et al., 1992). Furthermore, studies have found structural abnormalities associated with HIV infection in the frontal cortex as well as neocortical thinning (Jernigan et al., 2005; Thompson et al., 2005). Although there is evidence that HIV is associated with abnormalities the frontal cortex, there is also support showing that neurocognitive deficits associated with localized frontal dysfunction (Moore et al., 2006), may be driven by damage to broader neural networks that are dependent on the frontostriatal circuits (Woods et al., 2009). As previously mentioned, lowered volumes of cerebral white matter broadly affect the brain; however, these abnormalities often affect frontal white matter and subcortical pathways that may indicate the severity of synaptodendritic injury (Archibald et al., 2004; Woods et al., 2009). Evidence of frontostriatal dysfunction includes magnetic resonance (MR) spectroscopic markers of neuroinflammation found in the striatum, damage to frontal gray and white matter in early stages of infection, and neuronal damage (i.e., decreased N-
tissue (acetylcholinesterase), an indicator of neuroaxonal injury) observed in the white matter of the frontal cortex and basal ganglia (Ernst & Chang, 2004; Paul 2008). Dysfunction of the frontostriatal circuits may be caused by susceptibility to viral trafficking across the blood brain barrier (Berger & Arendt, 2000), the involvement of specific types of neurons (e.g., large spiny neurons), and/or the neurotransmitter systems such as dopamine and glutamate in the neuropathogenesis of HIV (Langford et al., 2005; Woods et al., 2009).

**HIV Infection and Aging**

The prevalence of HIV infection among older adults has increased within the last 10 years and approximately one-quarter of individuals living with HIV are 50 years of age and older (Centers for Disease Control and Prevention, 2007). Not only are adults with HIV at greater risk for rapid progression of the disease (e.g., Goetz et al., 2001), but they also show more complications of the CNS associated with neuropathological problems (e.g. beta-amyloid deposition; Green et al., 2005), lower volumes of gray matter in the frontal cortex (Jernigan et al., 2005), and evidence of neural injury in the frontal white matter and basal ganglia (e.g., Ernst & Chang, 2004). In addition, older HIV-infected individuals are more likely to be affected by HAND, even when controlling for variables such as treatment, disease severity, and psychiatric confounds (Valcour et al., 2004).

**Temporal Order Memory**

Temporal order memory refers to memory for the order in which events have been experienced. Evidence from studies with frontal lobe lesions in humans (Kesner, Hopkins, & Fineman, 1994; Kopelman, Stanhope, & Kingsley, 1997; McAndrews & Milner, 1991; Milner, 1971; Milner, Corsi, & Leonard, 1991; Shimamura, Janowsky, & Squire, 1990), primates (Inoue and Mikami, 2006; Ninokora, Mushiake, & Tanji, 2004), and rat models (Chiba Kesner, & Gibson, 1997; Hanneson, Vacca, Howland, & Phillips, 2004) demonstrate that the frontal cortex is important for temporal order memory (Pirogovsky et al., 2009). The frontal cortex may be responsible for processes that organize the temporal sequencing of events (Fuster, 2001). Since HIV has been shown to be associated with dysfunction of the frontostriatal circuits, temporal order memory may be particularly sensitive to neuropathological changes in HIV infection. Evidence from prior studies demonstrated compromised temporal perception (e.g. semantic event sequencing) in HIV (Melrose et al., 2007), and deficits in strategic aspects of episodic memory in older HIV- infected adults (e.g. Woods et al., 2010). However, no study to date has investigated temporal order memory in HIV-infected older adults.

The purpose of the present study was to use a computerized task to examine temporal order memory in older adults with HIV infection and seronegative adults. Previous research has shown that individuals perform temporal order memory tasks more efficiently when items occur farther apart in a temporal sequence, as opposed to when they are temporally proximal (Kesner & Hopkins, 2006). This is referred to as the temporal separation effect and it is thought that individuals experience increasing temporal interference for temporally proximal stimuli than temporally distal stimuli (Gilbert, Kesner, & Lee, 2001). Therefore, the present task involved parametric manipulations of the temporal metric by systematically varying the number of temporal separation lags (i.e. 0, 2, 4, 6) in a temporal sequence (Pirogovsky et al., 2009). A temporal order task involving parametric manipulations of the temporal metric may reveal deficits that range from subtle to severe using a single paradigm. Examining temporal order memory in HIV-infected adults may elucidate a fundamental deficit that could potentially inform behavioral interventions that may improve performance in IADLs via the mitigation of temporal interference.

**Methods**

**Participants**

Seropositive participants (n = 38) who were ages 50 and higher were recruited from the HIV Neurobehavioral Research Center (HNRC) at the University of California, San Diego via local print media publications and in HIV clinical treatment settings. Each participant was issued written informed consent prior to enrollment in the study, which was sanctioned by the University of California San Diego human research protections program. Individuals with clinical evidence of severe psychiatric illness, neurological disease, substance dependence, and/or a urine toxicology screen that was positive for illicit drugs (except marijuana) on the day of assessment were excluded from participation. Seronegative participants (n = 31) who were ages 40 – 55 were recruited as normal controls from the San Diego Community. Exclusion criteria for the seronegative group included a history a neurological condition (e.g. seizures, head injury), a neurodegenerative disease, a history of alcohol or other substance abuse, or clinical evidence for a psychiatric illness existing within the last 6 months. Seronegative participants were administered the Dementia Rating Scale (DRS; Mattis, 1976) for dementia screening. Written informed consent was issued to all seronegative participants according to the Declaration of Helsinki and approved by the University of California, San Diego, and San Diego State University. A one-way analysis of variance (ANOVA) of group did not detect any significant differences in age between the seropositive and seronegative groups, as shown in Table 1.
Temporal Order Memory Task

A previously published paradigm was used to measure temporal order memory (Pirogovsky et al., 2009). Each participant was seated approximately 60 cm in front of a computer monitor (59 cm diagonal). The participant was told to concentrate on the area of the screen where a computerized radial eight-arm maze was presented at the start of each trial. Similar to spokes of a wheel, the eight arms extended from a center with a diameter of approximately 30 cm. A circle would appear on an end of one arm, and the location of the circle would change in a random sequence. The participant was instructed to remember the sequence in which the circles were presented on the arms.

Each trial consisted of a sample phase, and was immediately followed by a choice phase. During the sample phase, a gray circle (3-cm diameter) appeared at one end of a randomly selected arm. After the gray circle appeared on the arm for 2 s, the entire screen immediately displayed a gray mask to eliminate after-image effects. This sequence continued until a gray circle was presented on each of the eight arms once in a random order, varying on each trial. During the choice phase, each participant was presented simultaneously with two circles, one red and one blue. Each circle was located at the end of two previously presented sample-phase arms for 5 s. Participants were asked to state which colored circle appeared earlier in the sequence.

The temporal separation lags represented the number of arms occurring in the sample phase sequence between the two choice arms displayed simultaneously during the choice phase. Each choice phase consisted of randomly selected temporal separation lags of 0, 2, 4, and 6. Three choice phases were conducted after each sample phase sequence, including three random temporal separation lags out of the four possible lags. The entire task consisted of 16 distinctive sample phase sequences, followed by three choice phases for each sequence. This resulted in 12 choice phase trials for each of the four temporal separations. After each of the 16 sample phases, a 5-s intertrial interval was implemented to allow a rest period between each trial. The experimenter recorded the participant’s responses to the choice phase trials. The number of correct responses within the twelve choice phase trials for each of the four temporal separation lags were converted into a percent correct score for data analysis.

Results

Temporal Order Memory Task

A 2 x 4 analysis of covariance (ANCOVA) with group (seropositive, seronegative) as a between-group factor, temporal separation lag (0, 2, 4, 6) as a within-group factor, and age and sex as covariates was used to analyze the data. The main effect of age and the age x lag interaction were not statistically significant (see Figure 1). The main effect of sex and the sex x lag interaction also did not reach significance. However, the analysis did reveal a significant main effect of group [F(1,65)= 27.40; p < .001] in which seropositive participants scored significantly higher on the temporal order memory task than seronegative participants. The ANCOVA also revealed a significant main effect of lag [F(3,195)=2.94; p < .05] with participants in both groups performing better on trials involving larger temporal separations than trials involving smaller temporal separations. There was no significant lag x group interaction.

Discussion

The present study examined the effects of temporal interference on temporal order memory in HIV. The results of the study found that temporal order memory was impaired in individuals in the HIV group relative to the seronegative group. In addition, performance across groups differed as a function of temporal separation lag, with participants in both groups performing better on trials involving larger temporal separations than trials involving smaller temporal separations. Participants in the HIV group demonstrated impaired performance across all temporal separations (0, 2, 4, 6 lags) relative to the seronegative group. The results demonstrate that temporal order memory deficits were detectable in individuals with HIV when controlling for sex and age.

Temporal order memory impairment in HIV may be related to neuropathological changes in the frontal lobes or frontostriatal circuits, congruent with previous research examining temporal order memory and Huntington’s disease (Pirogovsky, et al., 2009). HIV is associated with structural abnormalities in the frontal cortices, including lower volumes and neocortical thinning, even without opportunistic infection. The frontostriatal circuits and the frontal cortex are particularly vulnerable to HIV infection and are important for temporal order memory (Cabeza et al., 1997; Knutson, Wood, & Gruuffman, 2004; Suzuki et al., 2002). The present findings that deficits in the temporal domain exist in HIV are consistent with prior studies showing deficits in strategic aspects of episodic memory in old HIV-infected adults (Woods et al., 2010).

Table 1. Mean (SE) demographic information of seropositive and seronegative participants.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Seropositive (n = 38)</th>
<th>Seronegative (n = 31)</th>
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<tr>
<td>Age</td>
<td>54.39 ±  .85</td>
<td>53.56 ± 1.5</td>
</tr>
<tr>
<td>Gender (% male)</td>
<td>84%</td>
<td>69%</td>
</tr>
<tr>
<td>Ethnicity (%)</td>
<td>68%</td>
<td>85%</td>
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<tr>
<td>Caucasian</td>
<td>13.53 ± .46</td>
<td>15.48 ± .35</td>
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Note. Mean (± standard error) demographics for participants.
Therefore, there is evidence that temporal order memory impairments in individuals with HIV may be a result of frontostriatal neuropathology.

Temporal order memory impairments in HIV may contribute to episodic memory deficits. For example, remembering when to take a medication involves recalling a sequence of linked events not only in a spatial context (e.g., in the medicine cabinet), but also in a temporal context (e.g., mornings, as opposed to nights). The literature reveals that HIV-associated cognitive deficits are associated with inconsistent medication adherence that is affected by deficits in episodic memory and executive dysfunction (Woods, 2009). Understanding the cognitive and neural mechanisms of HIV-associated impairment in temporal order memory may be essential in explaining a fundamental deficit that could potentially inform behavioral interventions that structure daily living tasks to mitigate temporal interference in HIV.

Table 2. Results from a 2 X 4 ANCOVA, with Group as a between-group variable, Temporal Separation Lag as a within-group variable, and Sex and Age as covariates.

<table>
<thead>
<tr>
<th></th>
<th>F(df)</th>
<th>p</th>
<th>η²</th>
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<tbody>
<tr>
<td>Group</td>
<td>F (1, 65) = 27.40</td>
<td>.001</td>
<td>.297</td>
</tr>
<tr>
<td>Sex</td>
<td>F (1, 65) = .010</td>
<td>.920</td>
<td>.000</td>
</tr>
<tr>
<td>Age</td>
<td>F (1, 65) = 1.7</td>
<td>.190</td>
<td>.026</td>
</tr>
<tr>
<td>Lag</td>
<td>F (3, 195) = 2.94</td>
<td>.035</td>
<td>.043</td>
</tr>
<tr>
<td>Lag x Group</td>
<td>F (3, 195) = .393</td>
<td>.758</td>
<td>.006</td>
</tr>
<tr>
<td>Lag x Sex</td>
<td>F (3, 195) = 1.00</td>
<td>.393</td>
<td>.015</td>
</tr>
<tr>
<td>Lag x Age</td>
<td>F (3, 195) = 1.98</td>
<td>.118</td>
<td>.030</td>
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Note. ANCOVA = analysis of covariance

Figure 1. Mean (± standard error) percent correct performance of seronegative individuals and individuals with HIV on the temporal order memory task as a function of temporal separation lag (0, 2, 4, 6).
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