EVALUATING THE IMPACT OF ATAQUES DE NERVIOS ON COGNITIVE FUNCTIONING IN PUERTO RICANS WITH ANXIETY DISORDERS: A PILOT STUDY*

EVALUACIÓN DEL IMPACTO DE ATAQUES DE NERVIOS EN EL FUNCIONAMIENTO COGNITIVO DE PUERTORRIQUEÑOS CON TRASTORNOS DE ANSIEDAD: UN ESTUDIO PILOTO

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ABSTRACT

Ataques de nervios (ADN) is a cultural syndrome among Latinos characterized by emotional reactions triggered by upsetting interpersonal situations. ADN is highly comorbid with anxiety and trauma-related disorders. To date, it is unclear if ADN comorbidity brings additional difficulties in regulation and cognitive abilities. We compared if performance in cognitive tests differed among groups with anxiety disorders and group with co-morbid ADN using a Puerto Rican sample and how this related to associated psychological constructs. Methods: Participants were 19 subjects (12 with ADN) with an anxiety disorder. Spanish versions of the WAIS-III subscales, the WCST-IV, TMT, Stroop test, and RCFT assessed cognitive functions. Performance was then related to psychological constructs assessed by different self-report questionnaires, in both groups. Results: Subjects experiencing ADN showed decreased attention, concentration, and immediate memory. These differences were observed in their performance on the WAIS-III-Symbol Search sub-test (p=0.02) and the Rey-Complex Figure-Immediate Recall test (p=0.02). Conclusions: Individuals with co-morbid ADN showed worsened ability to concentrate, attend and retrieve information. Psychological constructs associated to the presence of ADN were correlated with worsened cognitive functioning. Further studies should be directed towards examining if this effect negatively impacts prognosis and treatment outcomes.
KEYWORDS: Anxiety disorders, *ataques de nervios*, cognitive functioning, culture síndromes.

RESUMEN

Ataques de nervios (ADN) es un síndrome cultural entre los latinos caracterizado por reacciones emocionales desencadenadas por situaciones interpersonales perturbadoras. El ADN es altamente comórbido con ansiedad y trastornos relacionados a trauma. Hasta la fecha, no está claro si la comorbilidad del ADN conlleva dificultades adicionales en la regulación y capacidades cognitivas. Comparamos si el rendimiento en pruebas cognitivas difería entre los grupos con trastornos de ansiedad y con ADN comórbido utilizando una muestra puertorriqueña. Se evaluó cómo esto se relacionaba con constructos psicológicos. Métodos: Participaron 19 sujetos (12 con ADN) con un trastorno de ansiedad. Las subescalas WAIS-III, WCST-IV, TMT, prueba Stroop y RCFT evaluaron funciones cognitivas. El rendimiento se relacionó con constructos psicológicos evaluados por cuestionarios. Resultados: Los sujetos que experimentaron ADN mostraron disminución de atención, concentración y memoria inmediata. Estas diferencias se observaron en la subprueba búsqueda de símbolos-WAIS-III (p=0.02) y la prueba recuperación inmediata-figuras complejas de Rey (p=0.02). Conclusiones: Las personas con ADN comórbido mostraron disminución en habilidad para concentrarse, atender y recuperar información. Los constructos psicológicos asociados a la presencia de ADN correlacionaron con un peor funcionamiento cognitivo. Los estudios adicionales deben dirigirse a examinar si esto impacta negativamente el pronóstico y respuesta a tratamiento.
PALABRAS CLAVE: Trastornos de ansiedad, ataques de nervios, funcionamiento cognitivo, síndromes culturales.

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Anxiety disorders are very common worldwide (Baxter et al., 2013). They impact cognitive and social functioning and affect individuals' quality of life. The interpretation of anxiety symptoms may vary culturally (Diefenbach et al., 2004), which increases the need to investigate cultural differences among these disorders. Therefore, culture, race, and ethnicity are important factors in the etiology and maintenance of psychopathology (Keough, Timpano, & Schmidt, 2009).

Culture can also affect how anxiety is expressed. For example, among Latinos, somatic symptoms are often reported (Diefenbach et al., 2004, Tofoli, Andrade, & Fortes, 2011). Several studies have reported that Puerto Ricans tend to report higher somatic symptoms (Angel & Guarnaccia, 1989) and show increased physiological responses to stimuli, compared to White non-Hispanics (Martinez, Franco-Chaves, Milad, & Quirk, 2014). These somatic responses are also expressed in a culture bound-syndrome described among Caribbean Latinos called ataque de nervios (ADN, attacks of nerves). The American Psychiatric Association (APA) Diagnostic Statistical Manual – 5 (DSM-5, 2013) describes ADN as characterized by intense emotional symptoms, such as anxiety, anger, or grief (e.g., screaming, crying, trembling, becoming verbally and physically aggressive, etc.), and as a sense of being out of control, and they typically follow a distressing event, such as the death of a loved one or remembering a traumatic memory (Guarnaccia et al., 2010, Hofmann & Hinton, 2014). ADN can be experienced among the Latino general population, but seems to be a significant marker of psychiatric liability among Puerto Ricans (Guarnaccia et al., 1993).

In an epidemiological study in Puerto Rico, approximately 16% of the sample reported an ADN (Guarnaccia, 1993). Another study among Latinos in the United States found that 15% of Puerto Ricans reported ADN, compared to 9.6% of Mexicans, 9% of Cubans, and 7% of other Latinos, which reflects a high frequency compared to other Latinos (Guarnaccia et al., 2010). In addition, ADN is highly comorbid with anxiety disorders and other trauma and stressor-related disorders (Lewis-Fernández et al., 2010), which might worsen clinical presentations. Symptom similarity between ADN and panic attacks also leads to confusion between the two disorders. It is therefore important to identify which cognitive and psychological processes are specific to ADN and which are shared with anxiety.

To study ADN, we selected a series of previously standardized cognitive tests for the Latino population that evaluate general cognitive processes (i.e. attention, concentration, memory and executive functions) and processing speed administered to a group of subjects diagnosed with anxiety disorders and a group with co-morbid ADN. We also assessed psychological constructs specific to anxiety such as anxiety sensitivity, personality traits, and affect regulation. Our objective was to determine if having an anxiety disorder and co-morbid ADN differ from individuals without ADN in the expression of cognitive processes and if among both groups, cognitive performance is related to psychological constructs specific to anxiety disorders. We hypothesized that subjects with ADN would show worse performance in at least one test of each cognitive domain (attention, concentration, processing speed, memory, and executive function), but both groups would show significant relationships between cognitive functioning and psychological constructs.

METHODS

Participants

The sample consisted of 19 subjects from Puerto Rico diagnosed with an anxiety disorder (78.9% female) with a mean age of 35.05 (Table 1). Twelve of the subjects (63%) had ataques de nervios (Table 2). Participants were recruited by local advertisement (e.g., flyers). Exclusion criteria included a history of neurological disorders and complicated

medical conditions, history or active substance or drug dependence in the last 6 months, and color blindness. The Structured Clinical Interview for DSM – IV Disorders (SCID-I-RV) was used to confirm anxiety diagnosis. A 3-question diagnostic questionnaire developed using DSM-5 cultural guidelines for ADN was used to validate the presence of ADN in each individual. Participants were asked a screening question: "During the last 6 months, have you ever experienced an episode or nervous attack where you felt totally out of control?" When participants responded positively to this question, they were asked if they had experienced certain symptoms during the episode (i.e., fear, sadness, anger, frustration, and distress). Those who responded positively to the screening questions were considered to meet criteria for an ADN. Validation results for this questionnaire will be published elsewhere. Subjects provided demographic information and a written informed consent, which agreed with Institutional Review Board (IRB) requirements at the University of Puerto Rico, Medical Sciences Campus.

TABLE 1.
Demographic and diagnostic characteristics of the sample.

Characteristic	Total (N =19) (%)	Mean (SD) (N =19)
Sex		
Male	4 (21.1)	-
Female	15 (78.9)	-
Age	-	35.05 (14.85)
Education (yrs)	-	15.47 (2.09)
Main Diagnosis		
Social anxiety	1 (5.3)	-
Spec. phobia	1 (5.3)	-
OCD	6 (31.6)	-
GAD	4 (21.1)	-
PTSD	3 (15.8)	-
PD w/ago	4 (21.1)	-
Comorbidity		
No	6 (31.6)	-
Yes	13 (68.4)	-
Trauma History		
No	6 (31.6)	-
Yes	9 (47.4)	-
Unknown	4 (21.1)	-

TABLE 2.
Demographic and diagnostic characteristics by group (ADN vs no ADN).

	No ADN (n=7)		ADN (n=12)	
	Total (%)	Mean (SD)	Total (%)	Mean (SD)
Sex				
Male	1 (14.3)	-	3 (25.0)	-
Female	6 (85.7)	-	9 (75.0)	-
Age		35.00 (15.32)		35.08 (15.26)
Education (yrs)	-	15.29 (1.70)	-	15.58 (2.35)
Main Diagnosis				
Social anxiety	1 (14.3)	-	-	-
Spec. phobia	-	-	1 (8.3)	-
OCD	2 (28.6)	-	4 (33.3)	-
GAD	3 (42.9)	-	1 (8.3)	-
PTSD	-	-	3 (25.0)	-
PD/agoraphobia	1 (14.3)	-	3 (25.0)	-
Comorbidity				
No	4 (57.1)	-	2 (16.7)	-
Yes	3 (42.9)	-	10 (83.3)	-
Trauma History				
No	2 (28.6)	-	4 (33.3)	-
Yes	4 (57.1)	-	5 (41.7)	-
Unknown	1 (14.3)	-	3 (25.0)	-

Measures and Procedures

Recruitment, psychological, and cognitive assessments were performed by qualified trained personnel at the Center for the Study and Treatment of Fear and Anxiety (CETMA, for its Spanish acronym), located at the University of Puerto Rico, Medical Sciences Campus.

As part of the initial assessment, participants completed several self-report measures of anxiety. In order to determine whether the neurocognitive deficits documented in previous anxiety research are also present in individuals with ADN, we administered cognitive tests to examine the following neurocognitive domains: attention, memory, executive functions, and social judgment. We also evaluated whether any of the neurocognitive deficits observed were related to other clinical or individual characteristics, such as symptom severity, gender, personality traits, age or comorbidity.

Psychological Assessment

The following psychological measures were administered to all participants during one session, which lasted approximately one hour. These instruments have been used previously in the Puerto Rican population (González-Barrios et al., 2016).

Anxiety Severity Measures

Beck Anxiety Inventory (BAI)

The Beck Anxiety Inventory (BAI) has 21 items and it evaluates the severity of anxiety. The English version of the BAI has an internal consistency of α=0.92 (Beck et al., 1988). A

study that used the Spanish version of the test including the Spanish general population obtained an alpha coefficient of 0.93 (Magán, Sanz, & García-Vera, 2008). In another study using elderly Puerto Rican participants, the BAI demonstrated high internal consistency, α=0.95 (Rodríguez-Reynaldo, Rodríguez-Gómez, & Martínez-Lugo, 2001).

State-Trait Anxiety Inventory (STAI)

The State-Trait Anxiety Inventory (STAI) consists of 20 items to measure state anxiety and 20 items to measure trait anxiety. The internal consistency of the Spanish version of this test, which included a Puerto Rican sample, ranges from 0.82 to 0.95, according to Spielberger et al. (1971). This inventory has been used in several studies that have included the Puerto Rican population (González-Barrios et al., 2016). This inventory has been validated for the Puerto Rican population by Virella, Arbona, and Novy (1994).

Anxiety Sensitivity Index (ASI)

The Anxiety Sensitivity Index (ASI) is composed of 16 items and it is used to evaluate anxiety-related sensations. It has been shown that the ASI has good internal consistency, alpha coefficients 0.79 – 0.90 (Reiss et al., 1986). This index was validated in Spanish using a Spanish clinical sample (Sandin, Chorot, & McNally, 1996).

Personality Traits

NEO Five – Factor Inventory (NEO – FFI)

The NEO Five-Factor Inventory (NEO – FFI) has 60 items that evaluate personality traits in five different dimensions: neuroticism, extraversion, openness, agreeableness, and conscientiousness. The scores are added in each dimension. Even though this inventory has not been validated for the Puerto Rican population, the long version has shown high internal consistency for this population, α=0.95 (McCrae & Terracciano, 2005).

Affect regulation

Emotional Dysregulation Scale (EDS)

The Emotional Dysregulation Scale (EDS) consists of 40 items that evaluate emotional changes and the inability to manage emotions. The psychometric properties for the Spanish version of the EDS have not been addressed and this scale has not been validated for the Puerto Rican population (González-Barrios et al., 2016).

Positive and Negative Affective Schedule (PANAS)

The Positive and Negative Affective Schedule (PANAS) evaluates the experience of particular emotions, regarding positive (e.g., excitement) and negative (e.g., afraid) affect and is composed of 10-item negative emotional scales and 10 positive emotional scales. Participants are asked to rate the extent to which they have experienced specific emotions using a 5-point Likert scale (González-Barrios et al., 2016). The PANAS was adapted for the Spanish-speaking population, showing elevated internal consistency ranging from 0.87 to 0.91, considering affect dimensions (Sandin et al., 1999).

Cognitive Assessment

The following cognitive tests were administered to all participants during another session, which lasted approximately one hour.

Trail Making Test (TMT)

The Trail Making Test (TMT) is a neuropsychological test used to evaluate cognitive functions, such as visual attention and processing. In Part A, subjects were asked to connect numbers (e.g., 1 – 2 – 3, etc.), while in Part B, they were required to connect numbers and letters by alternating them (e.g., 1 – A – 2 – B, etc.). Scores were obtained by timing trials and errors during the test. The TMT (times needed to complete Part A and B) was used to evaluate attention (Part

A) and psychomotor speed (Part B). Arango-Lasprilla et al. (2015) generated normative data on the TMT for Latinos, including Puerto Ricans.

Wechsler Adult Intelligence Scale – Third Edition (WAIS – III)

The Wechsler Adult Intelligence Scale – Third Edition (WAIS – III) was originally created by David Wechsler in 1955 and it measures general intelligence (Pons et al., 2008). This test was validated for the Puerto Rican population by Pons et al. (2008). It is composed of 13 subtests, although for this study we only used five of these: Symbol Search, Digit-Symbol, Letter-Number Sequencing, Digit Span, and Comprehension.

a. Symbol Search subtest

The WAIS – III – Symbol Search sub-test measured perceptual discrimination, attention, concentration, and cognitive flexibility.

b. Digit-Symbol subtest

The Digit-Symbol subtest from the WAIS – III evaluated visual-motor coordination and the process of learning new information in an associative visual context.

c. Letter-Number Sequencing subtest

The Letter-Number Sequencing subtest from the WAIS – III evaluated attention, memory, and information processing.

d. Digit Span subtest

The Digit Span sub-test (Forward and Inverse) from the WAIS – III was used to evaluate attention span and working memory.

e. Comprehension subtest

The WAIS – III Comprehension subtest measured social judgement and the comprehension of social norms.

Rey –Complex Figure Test (RCFT)

The Rey –Complex Figure Test (RCFT), created by André Rey in 1941 and standardized by Osterrieth (Shin, Park, Park, Seol, & Kwon, 2006), evaluates neuropsychological functions, such as memory, visuospatial abilities, attention, and concentration. It consists of three phases: Copy Phase, Immediate Recall Phase, and Delayed Recall Phase (administered 30 minutes later). During the Copy Phase, participants copied the Rey figure by observing it. During the Immediate Recall Phase, they reproduced what they remembered of the Rey figure without observing it. During the Delayed Recall Phase, which was administered 30 minutes later, participants were asked to draw what they remembered of the Rey figure. Scoring took place by giving each scoring unit a value from 0 to 2, which depended on the scoring unit's accuracy and correct placement. In the RCFT Recognition trial, which assessed recognition memory, participants identified pieces of the Rey figure; 12 were correct elements and 12 were distractors.

Stroop Test

The Stroop Color Naming and Color/Word Interference test measures attention, concentration (i.e. selective attention) and response inhibition. In the interference task, participants are shown incongruently colored words and asked to name the color in which the word is printed, while inhibiting the automatic tendency to simply read the word.

Wisconsin Card Sorting Test – Fourth Edition (WCST – IV)

The Wisconsin Card Sorting Test – Fourth Edition (WCST-IV) was used to assess cognitive flexibility and set-shifting abilities. In this test, participants tried to find ways of sorting cards according to these characteristics: color (red, blue, green, or yellow), number (1, 2, 3, or 4), and form (circles, squares, stars, or crosses). The total number of perseverative errors, non-perseverative errors, and categories completed were scored according to the test manual.

Statistical analyses

Statistical analyses were carried out using IBM SPSS version 22.0 software for Mac. Given the sample size, we used non-parametric statistics for all analyses. Comparisons between participants with and without ADN were evaluated using the Mann-Whitney U test. Spearman correlations were performed to analyze the relationship between each cognitive test and anxiety, personality and affect regulation measures. Differences were considered significant if $p < 0.05$.

RESULTS

Mann-Whitney U test showed that there were significant differences in scores between groups in tests that evaluated attention, concentration, and working memory. Subjects experiencing ADN performed worse on the WAIS III – Symbol Search sub-test, compared to individuals without ADN, $z = -2.33$, $p = 0.017$. Additionally, individuals with ADN had worse performance on the Rey Complex Figure Test (RCFT) – Immediate Recall Phase, $z = -2.37$, $p = 0.017$. In the RCFT, when asked to immediately recall the figure, subjects with ADN showed poor recall of figure details, complete disintegration of figure components, line distortions, poor visuospatial orientation in comparison to the figure, poor angles in shapes, and replaced shapes (e.g., triangles instead of rectangles). There were no significant differences between groups on other tests that assessed cognitive functions.

As expected, cognitive performance of both groups highly correlated with assessed psychological constructs: anxiety symptoms, personality traits, and affect regulation measures (see Table 3 & 4). Interesting findings include that measures of emotional dysregulation correlate with several cognitive tests in the without ADN group but with no tests in the group with co-morbid ADN. Another important finding was that WCST Perseverative Errors was highly correlated with all anxiety symptoms, neuroticism, and negative affect in the ADN group, but only with trait anxiety and neuroticism in the without ADN group. The WAIS III-Symbol Search was significantly correlated to trait anxiety in both groups and with neuroticism in the group with ADN. In contrast, no significant correlations were found in either of the two groups with the RCFT-Immediate Recall Phase.

TABLE 3.
Correlations between cognitive tests and psychological measures- AND.

Variables	Emotion Dysreg. (n=9)	ASI (n=9)	BAI (n=11)	PANAS NEG (n=11)	Neuroticism (n=11)	STATE (n=11)	TRAIT (n=11)
Trail Making A	.059	.360	.162	.261	.415	-.039	.264
Symbol Search	-.251	-.435	-.338	-.516	**-.689***	-.447	**-.753****
Digit Symbol	-.433	-.378	-.388	-.297	-.446	-.525	**-.606***
Rey Complex Figure (Copy)	.018	-.080	-.159	-.473	-.348	.106	-.145
Stroop Color	.268	-.093	-.073	-.387	-.534	-.128	-.335
Stroop Word	.067	-.210	-.046	.251	.164	-.155	-.082
Rey Complex Figure Immediate Recall	-.251	-.384	-.114	-.274	-.350	-.384	-.160
Rey Complex Figure Delayed Recall	-.286	-.381	-.069	-.129	-.432	-.336	-.222
Letter-Number Sequencing	-.102	-.524	-.148	.044	-.222	-.363	-.167
Digit Forward & Backward	-.600	-.563	-.303	**-.602***	-.401	**-.740****	-.544
Rey Recognition	-.261	-.089	-.112	-.048	-.452	-.014	-.147
WCST Perseverative Errors	.350	**.866****	**.653***	**.642***	**.799****	**.637***	**.897****
WCST Perseverative Responses	.317	**.840****	.592	.542	**.826****	.565	**.881****
WCST Non-Perseverative Errors	.109	.624	.421	.458	.516	.243	**.651***
WCST Conceptual Level Responses	.586	-.034	.258	.178	.112	.306	.435
Trail Making B	.168	**.750***	.275	.389	.122	.378	.241
Stroop Interference Measure	.467	-.261	-.378	-.292	-.050	.091	.087
Comprehension	-.588	.013	.062	-.289	-.177	**-.615***	-.140

TABLE 4.
Correlations between cognitive tests and psychological measures- No ADN (n=7).

Variables	Emotion Dysreg.	ASI	BAI	PANAS NEG	Neuroticism	STATE	TRAIT
Trail Making A	**.764***	.427	.064	.685	.090	.036	.523
Symbol Search	.309	.145	-.582	.144	.559	.300	**.937****
Digit Symbol	.264	-.009	-.227	.360	.234	**.764***	.685
Rey Complex Figure (Copy)	-.046	-.073	-.092	.218	.018	**.771***	.364
Stroop Color	-.482	.582	.236	-.523	-.505	-.136	.000
Stroop Word	-.273	**.836***	.618	-.487	-.739	-.545	-.306
Rey Complex Figure Immediate Recall	.126	-.324	-.108	.250	.214	.667	.214
Rey Complex Figure Delayed Recall	.126	-.324	-.108	.250	.214	.667	.214
Letter-Number Sequencing	-.312	**-.784***	-.141	.120	.139	.231	-.538
Digit Forward & Backward	**-.804***	-.711	-.411	-.408	.185	.318	-.334
Rey Recognition	-.187	.075	-.150	-.296	.037	.318	.371
WCST Perseverative Errors	.524	-.318	-.729	.408	**.852***	.524	**.927****
WCST Perseverative Responses	.467	-.449	**-.823***	.482	**.927****	.598	**.889****
WCST Non Perseverative Errors	.764*	-.055	-.145	.613	.360	.118	.487
WCST Conceptual Level Responses	.593	.037	.056	.569	.092	-.148	.128
Trail Making B	.645	-.109	.255	.685	.036	.173	-.036
Stroop Interference Measure	-.054	-.288	-.036	-.036	.143	.252	-.107
Comprehension	-.631	-.054	-.198	**-.929****	.071	-.468	-.250

DISCUSSION

In this study, we evaluated if individuals with anxiety disorders and ADN differed in their cognitive and psychological functioning using a Puerto Rican sample. Our results show that the presence of ADN might be related to worse performance on tasks related to visuospatial memory, attention and concentration assessed by WAIS-III Symbol Search and the RCFT-Immediate Recall Phase. Given the cross-sectional nature of our data, it is difficult to establish if the presence of ADN is the cause for alterations in cognitive functions or if difficulties on these cognitive functions could be a risk factor for ADN. It is interesting to note that since ADN usually occur due to an interpersonal stressor, having difficulty with attention and concentration could lead to misinterpretation of situations that can then lead to excessive emotional reactions. Interestingly, the scores on these tests were not correlated to any state anxiety measure but did show relationships with trait measures such as trait anxiety and neuroticism. This could mean that the cognitive processes assessed by these tasks in an individual with increased traits predisposing to negative emotions can lead to the development of ADN. Nonetheless, we must reiterate that the cross-sectional nature of our analysis impedes from identifying such relationships. These patterns of performance should be furthered studied with an adequate design and a larger sample size.

Although no group differences were found in tasks of executive functions as measured by the WCST, we found interesting different correlations in each group. Trait anxiety and neuroticism seemed to be related to WCST scores in both groups, but the severity of anxiety symptoms was only related to performance of executive function in the presence of ADN. Anxiety was related to preservative errors, which could reflect that difficulties in learning and identifying patterns is more related to increased anxiety. On the other hand, we found that emotion regulation, as measured by a self-report questionnaire, was more correlated to performance on WCST in the absence of ADN. Although this may seem as an unexpected finding as ADN in itself is an expression of poor emotional regulation, previous studies support that emotion dysregulation is more prominent in

the presence of anxiety, specifically in late adulthood (Orgeta, 2011), and generalized anxiety disorder (Mennin, Heimberg, Turk, & Fresco, 2005). It will be important to evaluate the items measured by the emotional dysregulation scale and compare them to the description of ADN in future studies. However, we can begin to hypothesize that ADN might be more related to increased anxiety sensitivity rather than poor emotion regulation, as found in previous studies (Hinton et al. 2008). Anxiety sensitivity is also higher in the presence of other psychiatric co-morbidities, such as trauma and personality disorders. Although we included individuals with trauma-related disorders, given our small sample size, we could not further evaluate if found patterns are related to the presence of trauma. Further studies should also address if in fact anxiety sensitivity and other psychiatric co-morbidities (i.e., trauma and personality disorders) not only increases the presence of ADN, but negatively impacts executive control in individuals who experience them (Hughes, Crowell, & Uyeji, 2012). These patterns of cognition may be related to underlying alterations in neural mechanisms, which impact response to therapeutic interventions.

Cross-cultural research has shown evidence of cultural differences on neural mechanisms that underlie cognitive processes such as attention, concentration, memory, and executive functioning (Rule, Freeman, & Ambady, 2013). Studies evaluating the influence of culture in cognitive development show differences between Eastern and Western cultures (Kuwubara & Smith, 2012, Nisbet & Miyamoto, 2005) in areas, such as perceptual processing (Nisbett & Miyamoto, 2005), attentional control (Hedden, Ketay, Aron, Markus, & Gabrieli, 2008), and emotional judgment (Kuwubara, Son, & Smith, 2011). In their study, Telzer, Masten, Berkman, Lieberman, & Fuligni (2010) used functional magnetic resonance imaging (fMRI) and observed differences in the activation of the reward system of White and Latino individuals. Latino participants showed heightened activity of the reward system when they contributed to their family, while White participants showed heightened activity of the reward system when there were personal rewards (Telzer et al., 2010). González et al. (2015) recently reported that Hispanics/Latinos are at a higher risk for developing dementia compared to non-Hispanics. They found that Caribbean Hispanic/Latinos showed lower scores on a series of neurocognitive tests, compared to other Hispanic/Latinos; verbal episodic learning and memory were lower in Puerto Rican and Cuban participants, compared to other Hispanic/Latinos (González et al., 2015). This evidence highlights the influence of cultural factors on the activation of neural systems and thus, cognitive development and functioning. In order to improve our understanding of how culture interacts with psychopathology, studying the relationship between cognition and emotions seems to be crucial. Doing so while identifying the effect of co-morbidity among psychiatric disorders will also shed more light into understanding how to treat and manage psychopathology across cultures.

Limitations

Despite the fact that our study identified some differences in cognitive functions between people with anxiety and comorbid ADN, there are some important limitations that need to be discussed. A limitation of the current study is the use of small sample, which prevented further analysis assessing how trauma-related disorders could impact results. Also, the cross-sectional nature of our design limits identification of risk factors to psychopathology. Moreover, some of the measures and cognitive tests have not been validated specifically for the Puerto Rican population, although all have been used with Hispanic populations. Therefore, our results may not be generalizable. This is a preliminary study and may not be representative of all Puerto Ricans suffering from ADN. Future research should include a larger sample and a broader range of age groups.

Conclusions

In this study, we evaluated the possible differences in cognitive abilities between individuals with co-morbid ADN and anxiety and trauma-related disorders using standardized cognitive assessments. In addition, we evaluated if there was any significant relationship between cognitive performance and psychological constructs related to anxiety as measured by self-report questionnaires. The results of this study show that ADN seems to influence the cognitive functioning of individuals with anxiety disorders. Subjects that had an anxiety disorder and comorbid ADN revealed underperformance in tasks that measured visuospatial memory, attention and concentration, and slowed processing speed. Nevertheless, further research is needed to learn whether ADN is affecting these cognitive functions or if difficulties in these particular functions are a risk for developing ADN. Additionally, we found that their performance on cognitive tasks seemed to be associated with trait anxiety.

Although trait anxiety and neuroticism were associated to the performance in executive function tasks in both groups, anxiety severity influenced executive functions in individuals that had comorbid ADN. Results also showed that emotion regulation was correlated with cognitive test performance only in the absence of ADN. The findings of this study show the importance of considering psychiatric co-morbidities, such as personality disorders, given that their presence may have an impact in other areas functioning and thus, should be considered when treatment is provided to Latino patients.

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Institutional Review Board (IRB) Approval: This study was approved by the Institutional Review Board (IRB) of the University of Puerto Rico, Medical Sciences Campus.

Inform consent: Participants completed a written informed consent, which agreed with Institutional Review Board (IRB) requirements at the University of Puerto Rico, Medical Sciences Campus.

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