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Alexithymia and aggressiveness in old age: Mediation by impulsivity and emotion dysregulation

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Keywords

Aggression
Community
Emotion dysregulation
Residential care institutions
Multiple mediation analysis

Abstract

Aggressiveness is prevalent in old age, and to adapt treatments and diminish the accompanying damage to the self and others, it is important to understand aggressiveness predictors. Poor emotional awareness, impulsivity, and emotion dysregulation are potential mechanisms influencing aggressiveness. The present study examines whether alexithymia, emotion dysregulation, and impulsivity influence aggressiveness in older adults; and whether the effect of alexithymia is conditioned by emotional dysregulation and impulsivity after controlling for probable confounders. The sample consisted of 326 Portuguese older adults (63.2% female) aged 60-96 years from residential care homes and the community. Participants completed report instruments measuring alexithymia, emotional dysregulation, impulsivity, and aggressiveness. Results of the mediation analysis showed that older adults who had more alexithymia tended to report higher levels of emotional dysregulation and impulsivity, which in turn accounted for higher reported aggressiveness. All these effects were independent of cognitive functioning and depressive symptoms. This study suggests the relevance of evaluating and intervening on alexithymia, impulsivity, and emotion dysregulation to reducing aggressiveness in older people.

Alexitimia y agresividad en personas mayores: mediación por la impulsividad y la desregulación emocional

Palabras clave

Agresión
Comunidad
Desregulación emocional
Residencias geriátricas
Análisis de mediación múltiple

Resumen

La agresividad es frecuente en la vejez, y para adaptar los tratamientos y reducir los daños que la acompañan, tanto para sí mismo/a como para los demás, es importante entender los predictores de la agresividad. La pobre conciencia emocional, la impulsividad y la desregulación emocional son posibles mecanismos que influyen en la agresividad. El presente estudio examina si la alexitimia, la desregulación emocional y la impulsividad influyen en la agresividad de los adultos mayores; y si el efecto de la alexitimia está condicionado por la desregulación emocional y la impulsividad después de controlar los probables factores de confusión. La muestra consistió en 326 adultos mayores portugueses (63.2% mujeres) con edades comprendidas entre los 60 y 96 años procedentes de residencias geriátricas y de la comunidad. Los participantes completaron instrumentos de informe que medían la alexitimia, la desregulación emocional, la impulsividad y la agresividad. Los resultados del análisis de mediación mostraron que los adultos mayores que tenían más alexitimia tendían a reportar niveles más altos de desregulación emocional e impulsividad, lo que por a su vez explicaba un mayor reporte de agresividad. Todos estos efectos fueron independientes del funcionamiento cognitivo y de los síntomas depresivos. Este estudio sugiere la relevancia de evaluar e intervenir sobre la alexitimia, la impulsividad y la desregulación emocional para reducir la agresividad en personas mayores.

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Aggressiveness in old age

Aggression is frequent in older adults (Botngård et al., 2020), being a common outcome of different chronic conditions (Gimm et al., 2016; Leger et al., 2000), including cognitive impairment (Marcinkowska et al., 2020) and depressive disorders (Kwon, 2015), and is widespread in residential care institutions [RCI (Botngård et al., 2020)]. In RCI, aggression is probably an indicator of the adaptation process to institutionalization (Espirito-Santo & Daniel, 2018) and a reaction to institutionalization predicaments, especially those related to territoriality (Kolanowski, 1995). Moreover, aggression in these settings is not surprising given that impairments are the main reasons for RCI placement (Luppa et al., 2010) and that many of its residents have several psychological/neurocognitive problems (Daniel et al., 2019).

For the study of aggression, it is essential to clarify the underlying constructs. Aggressiveness is a tendency to convey anger, have hostile ideation, and be involved in physical or verbal aggression (Buss & Perry, 1992). Aggressiveness is thus a personality trait comprising, and also predicting, aggressive behaviors (Buss & Perry, 1992; Velotti et al., 2016).

The behavioral component of aggressiveness can be expressed violently in old age (Maia et al., 2019), having medical (e.g., falls, hospitalization) and social (changes in family life) consequences (Leger et al., 2000), and although aggression (mainly physical) tends to decrease with age (Knight & Hester, 2016), knowing the psychological predictors is important for prevention strategies. Gender differences exist, with higher physical and verbal aggression in men and more anger and hostility in women (Vigil-Colet et al., 2008). However, differences tend to decrease with age (Vigil-Colet et al., 2008).

Alexithymia and aggressiveness

Alexithymia is the inability to distinguish and designate one's emotions (Bagby et al., 1994), constituting a potential predictor of involvement in dangerous and (self)destructive behaviors (Kashdan et al., 2015), and being related to higher aggressiveness in (younger) adults (Garofalo et al., 2018; Velotti et al., 2016). Having a vocabulary of emotions allows emotions to be modulated in a healthy and socially adequate mode (Lambie & Marcel, 2002). In contrast, alexithymic people fail to use their emotions adaptively because they focus on bodily symptoms, do not link emotions to eliciting situations or to somatic activation, and do not distinguish emotions (Sifneos, 1996).

Higher levels of alexithymia have been reported in older adults (Onor et al., 2010), mostly in cognitively impaired ones (Onor et al., 2010). In contrast, there is evidence that emotion recognition and differentiation increase with age (Carstensen et al., 2000), probably because the vocabulary of emotions increases with the accumulation of experience (Kashdan et al., 2015). However, there is no data on its relationship with aggression/aggressiveness in old age.

Alexithymia, impulsivity, emotional dysregulation, and aggressiveness

Reduced mentalizing abilities (comprehension and regulation of thoughts and feelings and access to others' mental states) are associated with anger and aggression (Fonagy, 2004). This is probably why alexithymic individuals have problems with emotion regulation and impulse control, and, in turn, higher levels of aggressiveness (Garofalo et al., 2018).

The relationship between alexithymia and aggressiveness has recently been better understood: probable intermediary mechanisms responsible for this relationship have been identified, including impulsivity (Velotti et al., 2016), which has been associated with aggression (Hecht & Latzman, 2015), and emotional dysregulation (Velotti et al., 2016). Emotional dysregulation, in turn, has been linked to aggressiveness (Garofalo et al., 2016).

Impulsivity is a tendency to display rapid, unplanned, irresponsible, and potentially dangerous behaviors without concern for whether there is an impact on oneself or others (Hamilton et al., 2015). Impulsivity includes attentional impairment in processing contextual information and the inability to stop imprudent behaviors and delay gratification (Schmidt et al., 2004). In old age, levels of dysfunctional impulsivity are higher than in younger ages, which is consistent with inhibition deficits (Morales-Vives & Vigil-Colet, 2012; Sakurai et al., 2020). However, we have not found any previous research pointing to an impulsivity-aggression/aggressiveness link in old age.

Emotional dysregulation is a lack of emotional awareness, clarity, acceptance, and inability to use successful emotion regulation strategies, displaying goal-directed behavior when distressed, and regulating behavior while under stress (Gratz & Roemer, 2003). Emotional dysregulation includes maladaptive strategies associated with more significant psychological difficulties (Ramirez-Ruiz et al., 2019), which tend to be high in old age (Pereira et al., 2016). Paradoxically, emotional dysregulation tends to decrease with age (Orgeta, 2009).

Current research

Notwithstanding the relationship of alexithymia, impulsivity, and emotional dysregulation, to date, only two studies have shown that impulsivity and emotional dysregulation mediate the alexithymia-aggressiveness link in a community, a psychiatric, and a prison inmate sample (Garofalo et al., 2018; Velotti et al., 2016). Considering the high levels of aggression in old age, as far as we can tell, there is no study testing the mediator role of impulsivity and emotional dysregulation between alexithymia and aggressiveness in older adults. Thus, it is needed to ascertain if previous results (Garofalo et al., 2018; Velotti et al., 2016) are replicated in older ages.

The aims or our study were: 1) to examine whether alexithymia, impulsivity, and emotional dysregulation correlate with aggressiveness; 2) to explore whether the influence of alexithymia is conditioned by impulsivity and emotional dys-

regulation after controlling for possible covariates. In doing so, this study would provide an opportunity to confirm previous research, extend knowledge to the older population, contribute to adapting treatments, and diminish the accompanying damage to the self and others.

Thus, as in previous research, we adopt a multiple mediation approach to examine the following hypotheses:

H1. Inability to distinguish and designate one's emotions, impulsivity tendency, and emotional dysregulation correlate positively with aggressiveness.

H2. Impulsivity tendency and emotional dysregulation have a significant mediating effect between alexithymia and aggressiveness, controlling for probable confounding factors.

Methods

Participants and procedure

This study integrated the *Aging Trajectories'* project of the Miguel Torga Institute of Higher Education (PTE-ISMT) and was approved by the Ethics Committee of the ISMT (DI&D-ISMT/2-2013) and the 26 institutions' directors in the central region of Portugal. The procedures were derived from the PTE-ISMT (details in Espirito-Santo & Daniel, 2018; Figueiredo-Duarte et al., 2021). Following the Declaration of Helsinki, all participants gave written consent.

Older adults were recruited in RCI and the community between October 2018 and March 2019. In the community, enrollment was conducted by snowball sampling and geographical convenience. Inclusion criteria included: 1) age 60 or older, and 2) sufficient cognitive and sensorial abilities to understand the assessment instructions. Exclusion criteria comprised a diagnosis of 1) severe neurocognitive disease, 2) severe cognitive impairment, 3) severe organic disorder, and 4) alcohol abuse. In the RCI, diagnoses were based on participants' medical records. In the community, exclusion criteria were based on researchers' evaluation, participants' clinical records, and their answers to a multidimensional questionnaire.

A convenience sample of 326 older adults consented to participate in the research, 18 declined, and 73 were excluded due to serious illness, problem, or impairment. Trained psychologists assessed all volunteer participants (questionnaires were read) during a single session.

The total sample included 120 men (36.8%) and 206 women (63.2%), 209 from the community (64.1%), and 117 from RCI (35.9%), with a mean age of 75.12 (SD = 8.78; range 60-96 years) and mean education years of 5.06 (SD = 3.86).

Measures

Multidimensional questionnaire

The information included sociodemographic and clinical data (previous or current psychiatric/neurologic diagnosis, medication, and psychological/medical monitoring).

Buss-Perry Aggression Questionnaire – Short Form (BPAQ-SF)

BPAQ-SF (Bryant & Smith, 2001) evaluates aggressiveness components (physical, aggression, anger, and hostility) summed into a composite score and answered on a Likert scale (1–5 points). The composite score ranges between 12 and 60 points (higher aggressiveness). BPAQ-SF presented good psychometric properties, with the Cronbach's alpha of .88 – .92 in previous research (Bryant & Smith, 2001) and of .80 in the present study. BPAQ-SF was the outcome variable.

Twenty-Item Toronto Alexithymia Scale (TAS-20)

TAS-20 (Bagby et al., 1994) assesses alexithymia by responding to a five-point Likert scale. Higher scores indicate greater alexithymia (maximum score = 100). Reliability (Cronbach's alpha = .82) was in line with the original version (.81, Bagby et al., 1994). TAS-20 was used as a predictor variable.

Barratt's Impulsiveness Scale-15 items (BIS-15)

The BIS-15 (Spinella, 2007) measures general trait impulsiveness on a four-point Likert scale. Greater scores indicate higher levels of impulsivity (maximum score = 60). BIS-15's internal consistency was .81 in Spinella's version (2007), and in the present study was .74. BIS-15 was considered a mediator.

Difficulties in Emotion Regulation Scale-16

The DERS-16 items (Bjureberg et al., 2016) assesses significant difficulties in emotional regulation rated on a Likert scale (1 to 5), with scores ranging from 16 to 80 (greater emotional dysregulation). DERS-16 total score showed a Cronbach's alpha of .96 in this study. DERS-16 was considered another mediator.

Mini-Mental State Examination (MMSE)

We used MMSE (Folstein et al., 1975) to control cognitive function's potential confounding effect. MMSE is a 30-questions test assessing temporal and spatial orientation, memory, attention, and language. In our study, Cronbach's alpha was .86.

Geriatric Depression Scale-8 items (GDS-8)

We used GDS-8 (Figueiredo-Duarte et al., 2021) to control the probable confounding effect of depressive symptoms. GDS-8 has two response options (yes/no) regarding the last week. The score ranges from zero to eight (cut-off point > 6 suggestive of depression). Cronbach's alpha was .88 in this study, in line with the previous study (.87; Figueiredo-Duarte et al., 2019).

Data analysis

An *a priori* sample size calculation (G*Power; https://bit.ly/3FZArXO) for the group and correlation analysis revealed a

minimum sample size of 102 subjects to detect medium effects ($d = 0.50$; $r = 0.30$), 0.8 power, and $\alpha = .05$. For the mediation analysis, we assumed that the effect of TAS-20 on the mediators would be of medium-large size, and the effect of mediators on BPAQ-SF would be small-large (Garofalo et al., 2018; Velotti et al., 2016). A sample size between 34 and 396 was required for .80 power (Fritz & MacKinnon, 2007).

Statistical analyses were conducted using IBM SPSS software (version 26).

Descriptive statistics were computed to explore study variables, and group differences were tested using independent sample *t*-tests and Hedges's *g* effect size. For comparisons with different questionnaire versions, BIS-15 and DERS-16 scores were converted to the maximum possible percentage [M_{POMP} = (M – minimum possible score) / (maximum possible – minimum possible score) × 100] according to Cohen et al. (2010).

We calculated Pearson correlation and determination (R^2) coefficients to assess the relationships between predictor, mediators, and the outcome variable.

The mediation model was tested using the PROCESS macro for a matrix with two mediators (Hayes, 2018), where the predictor was TAS-20 (X), the outcome was BPAQ-SF (Y), and BIS-15 (M1) and DERS-16 (M2) the simultaneous mediators (Figure 1). MMSE and GDS-8 scores were included in the model as controls. Indirect effects were tested with bias-corrected bootstrapping (n = 5,000) and 95% confidence intervals (*CI*) for the indices. Indirect effects were compared by bootstrapping *CI*s for all possible pairwise contrasts between the two indirect effects (Hayes, 2018). Effects were considered significantly different from zero ($p < .05$) if zero was excluded from the upper and lower bounds of the 95% bias-corrected *CI*.

For the magnitude of the mediational effect, we reported: 1) the proportion mediated (*PM*), 2) the Sobel ratio of the indirect effect to the direct effect (*RM*), 3) the unstandardized indirect effect, and 4) the completely standardized indirect effect (Preacher & Kelley, 2011).

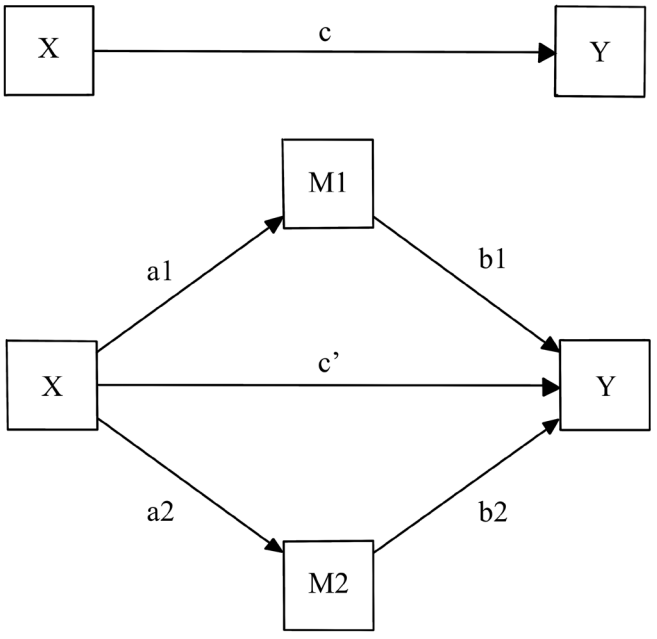

Figure 1

Diagram of a multiple mediational model

Note. c' = Direct effect of X on Y; c (Total effect) = $a1b1 + a2b2 + c'$; M1 and M2 = Mediator; X = Independent variable; Y = Dependent variable.

Results

Preliminary analyses

The Shapiro-Wilk test and the Skewness and Kurtosis values showed that the distribution of scores for some variables deviated from the normal curve (values between -0.31 and 4.22). Inspection of the boxplots revealed the presence of outliers in BPAQ-SF, BIS-15, and DERS-16. For these reasons, variables were transformed following the Templeton technique for data normalization (2011).

Descriptive analysis

The means and standard deviations of the study variables are presented in Table 1. M_{POMP} analysis showed values of 27.3% for BPAQ-SF, 47.8% for TAS-20, 28.8% for BIS-15, and 31.9% for DERS-16.

Role of sociodemographic factors

Analysis of individual differences (Table 2) revealed that TAS-20 scores were statistically significant higher in females, but the effect size was small. DERS-16 scores were statistically significant higher in females, with a small effect size. BIS-15 and BPAQ-SF scores did not differ between categories of comparisons. BPAQ-SF did not correlate with age (r = -.02; p = .710).

Correlation analysis

According to the first hypothesis (Table 1), BPAQ-SF correlated positively and moderately with all variables (R^2 between 19.4 and 47.6%). Moreover, BPAQ-SF correlated negatively and weakly with MMSE (R^2 = 2.4%) and negatively and moderately with GDS-8 (R^2 = 21.1%).

Mediation analysis

TAS-20 had an overall significant positive effect on BPAQ-SF scores ($B = 0.34$, $p < .001$), which decreased when DERS-16 and BIS-15 were included as mediators (Table 3).

As theorized, the effect of TAS-20 was mediated by BIS-15 and DERS-16 after controlling for MMSE and GDS-8 (Figure 2).

The overall indirect effect of alexithymia on aggressiveness via BIS-15 and DERS-16 was significant ($B = 0.19$, $p < .001$).

Table 1

Pearson's Correlations, Descriptive Statistics, and Reliability for the study variables

Variables	BPAQ-SF	TAS-20	BIS-15	DERS-16	MMSE	GDS-8
BPAQ-SF	—					
TAS-20	.54***	—				
BIS-15	.43***	.44***	—			
DERS-16	.56***	.69***	.45***	—		
MMSE	-.16**	-.29***	-.19**	-.27***	—	
GDS-8	.43***	.47***	.22***	.45***	-.21***	—
M	25.09	58.23	27.96	36.39	26.39	3.63
SD	7.99	10.25	6.60	17.09	4.01	3.63
Cronbach's α	.80	.82	.74	.96	.86	.88

Note. $N = 326$. BIS-15 = Barratt's Impulsiveness Scale; BPAQ-SF = The Buss-Perry Aggression Questionnaire – Short Form; DERS-16 = Difficulties in Emotion Regulation Scale; GDS-8 = Geriatric Depression Scale; MMSE = Mini-Mental State Examination; TAS-20 = Toronto Alexithymia Scale.
** $p < .01$. *** $p < .001$.

Table 2

Group descriptives of study variables

	BPAQ-SF			**TAS-20**			**BIS-15**			**DERS-16**		
Groups	*M* ± *SD*	*t*	**Hedges'** *g*	*M* ± *SD*	*t*	**Hedges'** *g*	*M* ± *SD*	*t*	**Hedges'** *g*	*M* ± *SD*	*t*	**Hedges'** *g*
Sex												
Male	24.38 ± 6.95	1.37	0.16	56.06 ± 10.48	2.96**	0.34	27.41 ± 7.41	1.13	0.13	32.11 ± 18.36	3.51***	0.40
Female	25.49 ± 7.14			59.50 ± 9.92			28.27 ± 6.07			38.89 ± 15.83		
Housing												
Community	25.30 ± 6.44	0.75	0.09	57.66 ± 10.35	1.36	0.16	27.82 ± 6.44	0.49	0.06	35.76 ± 16.98	0.89	0.10
RCI	25.09			59.26 ± 10.03			28.20 ± 6.89			37.52 ± 17.30		

Note. $N = 326$. BIS-15 = Barratt's Impulsiveness Scale; BPAQ-SF = The Buss-Perry Aggression Questionnaire – Short Form; DERS-16 = Difficulties in Emotion Regulation Scale; RCI = Residential care institutions; TAS-20 = Toronto Alexithymia Scale.
* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 3

Mediating effect of impulsiveness and emotional dysregulation in the alexithymia-aggressiveness link

Predictors	*β*	*B*	*SE B*	*t*	LL **95%** *CI*	UL **95%** *CI*
TAS-20 → BIS-15 (*a1*)	0.42	0.27	0.04	7.33***	0.20	0.35
TAS-20 → DERS-16 (*a2*)	0.52	0.87	0.08	10.76***	0.71	1.03
BIS-15 → BPAQ-SF (*b1*)	0.19	0.23	0.06	3.87***	0.11	0.35
DERS-16 → BPAQ-SF (*b2*)	0.26	0.12	0.03	4.23***	0.07	0.18
Direct effects: TAS-20 → BPAQ-SF (*c'*)	0.19	0.15	0.05	3.08**	0.05	0.25
Indirect effects: TAS-20 → BIS-15 → BPAQ-SF (*a1b1*)	0.08	0.06	0.02		0.03	0.10
Indirect effects: TAS-20 → DERS-16 → BPAQ-SF (*a2b2*)	0.16	0.11	0.03		0.06	0.19
Indirect effects: TAS-20 → BIS-15 → DERS-16 → BPAQ-SF (*a1b1* + *a2b2*)	0.24	0.19	0.01		0.01	0.04
Total effects: TAS-20 → BPAQ-SF (*c*)	0.43	0.34	0.04	8.14***	0.25	0.42
R2	41.0%					

Note. $N = 326$. Analysis computed with PROCESS macro with 5,000 bootstrap samples. β = Standardized regression coefficients; *B* = Unstandardized regression coefficients. BIS-15 = Barratt's Impulsiveness Scale-15 items; BPAQ-SF = The Buss-Perry Aggression Questionnaire – Short Form; DERS-16 = Difficulties in Emotion Regulation Scale-16 items; TAS-20 = Toronto Alexithymia Scale-20 items. All estimates were calculated taking into account Mini-Mental State Examination and Geriatric Depression Scale-8 items scores. Regression weights *a1, a2, b1, b2*, *c*, and *c'* are depicted in Figure 1.

Indirect effects through mediators were significant, indicating partial mediation. BIS-15 was a stronger mediator than DERS-16 ($B = 0.11$, $p < .001$ vs. $B = 0.06$, $p < .01$); however, the difference was not significant ($\Delta = -0.06$, $SE = 0.04$, 95% *CI*: -0.14 – 0.02).

The overall model accounted for 41.0% of the variance of BPAQ-SF ($F_{(5, 320)} = 44.04$; $p < .001$). The *PM* was 55.9%; however, it should be regarded cautiously, given that the standardized c was < 2 (Preacher & Kelley, 2011). Sobel's *RM* indicated that the indirect effect was 1.27 times the size of the direct effect. The unstandardized indirect denoted that BPAQ-SF decreases by 0.19 units for every one-unit increase in TAS-20 through BIS-15 and DERS-16. Finally, the $ab_{cs} = 0.31$, corresponding to a large effect size (Preacher & Kelley, 2011).

Discussion

Empirical data from three different samples (community, psychiatric, and inmates) suggested that impulsivity and emotional dysregulation can operate as mediational mechanisms between alexithymia and aggressiveness (Garofalo et al., 2018; Velotti et al., 2016). The current study was delineated to understand the associations between alexithymia, impulsivity, emotional dysregulation, and aggressiveness in older adults and ascertain if results with younger subjects (Garofalo et al., 2018; Velotti et al., 2016) would be replicated with older ones. Preliminarily, we discuss the descriptive findings of the study variables.

Aggressiveness, alexithymia, impulsivity, and emotion dysregulation levels

Our data indicated lower levels of aggressiveness than those described in samples of younger adults in the community (Garofalo et al., 2018, 2020; Velotti et al., 2016), which could be explained by the tendency for aggression to decrease with age (Knight & Hester, 2016). However, the lower levels in our sample are only 7.8% – 10.4% less than in offender samples (Garofalo et al., 2016, 2018, 2020; respectively, $M_{POMP} = 35.1\%$, 36.7%, 37.7%). These results align with the report by Botngård et al. (2020) that aggression is common in RCI. Depression (Figueiredo-Duarte et al., 2021), functional and cognitive impairment, or dementia (Daniel et al., 2019) are also frequent in RCI, all of which have been linked to aggression (Gimm et al., 2016). Given this, it is surprising that older people in the community reported similar levels of aggressiveness to RCI residents, probably because it is not adaptive for the institutional context as suggested (Espirito-Santo & Daniel, 2018).

Similar to other studies with older people (Onor et al., 2010), we found higher levels of alexithymia than those reported in younger samples (Velotti et al., 2016). However,

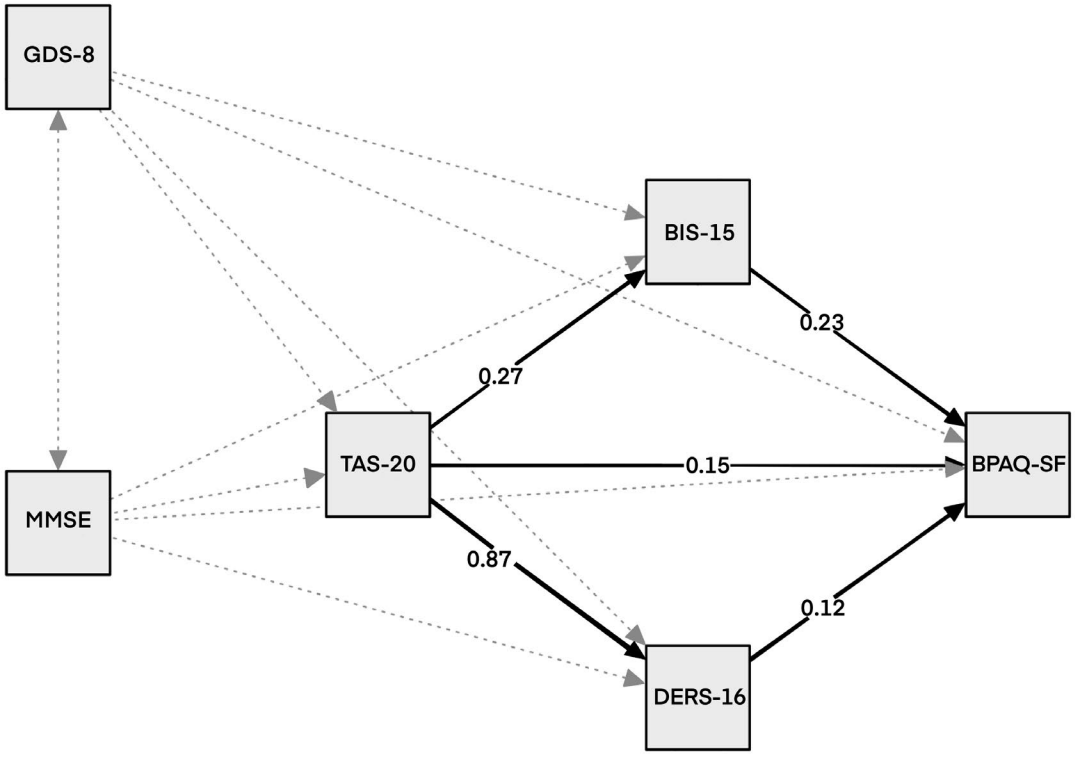

Figure 2

Alexithymia-aggressiveness link as mediated by impulsivity and emotional dysregulation controlling for depressive symptoms and cognitive functioning

Note. $N = 326$. All unstandardized regression coefficients (solid lines) were statistically significant ($p < .001$). Dashed lines represent covariates paths. BIS-15 = Barratt's Impulsiveness Scale; BPAQ-SF = Buss-Perry Aggression Questionnaire – Short Form; DERS-16 = Difficulties in Emotion Regulation Scale; GDS-8 = Geriatric Depression Scale; MMSE = Mini-Mental State Examination; TAS-20 = Toronto Alexithymia Scale.

our finding challenges the evidence that emotional recognition (Carstensen et al., 2000) and emotional vocabulary improve with age (Kashdan et al., 2015). Our result suggests that our older adults could have difficulty in understanding and accepting their emotions, focusing more on somatic symptoms without relating them to emotions (Sifneos, 1996). Considering the prevalence of depression in similar Portuguese samples (Figueiredo-Duarte et al., 2021), our suggestion is supported by studies indicating that older depressed people tend to somatize (Grover et al., 2019). Another argument in favor of higher levels of alexithymia among our older adults is the correlation with cognitive impairment, as noted in other research (Onor et al., 2010).

Paradoxically, the same argument could not be extrapolated to the levels of impulsivity. Consistently with our study, previous research showed that impulsivity levels were correlated with cognitive functioning (Morales-Vives & Vigil-Colet, 2012); however, our impulsivity levels were not higher than those of younger samples levels (Velotti et al., 2016), and were lower compared to the three groups of older people (without impairment, mild cognitive impairment, and probable dementia, Sakurai et al., 2020). We believe that cohort-specific characteristics may explain this discrepancy: participants in the Sakurai et al. (2020) study had more years of education, as well as being from a different culture.

Our results indicate similar low levels regarding emotional dysregulation compared to those reported in younger non-clinical samples (Orgeta, 2009; Velotti et al., 2016), and a different older sample (Orgeta, 2009). This is anticipated given Orgeta's (2009) findings suggesting fewer emotional regulation difficulties in old age.

Aggressiveness, alexithymia, impulsivity, and emotion dysregulation correlations

Our first hypothesis was that alexithymia, impulsivity tendency, and emotion dysregulation would be positively correlated with aggressiveness. Our data supported this prediction, showing similar and high-moderate correlations amongst those constructs and suggesting an underlying latent construct (Garofalo et al., 2018).

When breaking down each correlation, older adults with higher alexithymia reported more aggressiveness. This finding was consistent with previous research linking alexithymia and aggressiveness in other age groups in the community (Garofalo et al., 2018; Velotti et al., 2016), in psychiatric inpatients (Velotti et al., 2016), and in violent offenders (Garofalo et al., 2018). Thus, ignorance of which and why an emotion is experienced (Bagby et al., 1994), or the inability to differentiate and label one's emotions (Lambie & Marcel, 2002) probably impairs the modulation of aggressiveness into socially appropriate expressions in older people.

Regarding impulsivity, this is the first study to show that older people who report higher levels of impulsivity exhibit more aggressiveness. Thus, older adults who express more aggressiveness tend to behave rashly, unthinkingly, thoughtlessly, and potentially dangerously, without concern for the impact on oneself or others. This correlation is consistent with other studies with different samples (Hecht & Latzman, 2015).

As in other studies (Garofalo et al., 2016), we found a link between emotional dysregulation and aggressiveness. This finding is consistent with aggression being explained as a way of expressing unwanted emotions through words and actions, in the absence of adaptive coping strategies (Elison et al., 2014).

Mediation model for aggressiveness alexithymia, impulsivity, and emotional dysregulation

Older adults with higher alexithymia reported more impulsivity and greater emotional dysregulation, and this greater impulsivity and emotional dysregulation translated into greater aggressiveness. These data are also per previous studies (Garofalo et al., 2018; Velotti et al., 2016). Thus, the second prediction was also sustained with older people, extending previous results with younger participants and being congruent with the concept of mentalization by Fonagy (2004).

However, the mediational role of impulsivity and emotional dysregulation was only partial, similar to what occurred with a community group, and different from a psychiatric group (Velotti et al., 2016) and a sample of violent offenders (Garofalo et al., 2020). This finding suggests that aggressiveness is not a direct product of alexithymia and that other processes, besides impulsivity and emotional dysregulation, are likely involved. Some possibilities include cognitive mechanisms such as anger rumination (Wang et al., 2020), distortions in the social information process (Brugman et al., 2015), or feelings of control over the situation (Warburton et al., 2006).

Limitations and future directions

Since we studied a sample of older adults from the central region of Portugal, the generalizability of results to the national level and to other cultures may be limited. Nevertheless, we had a fairly large sample, several recruitment settings, with minimal exclusion criteria, enhancing the generalizability of our study. In addition, future studies may aim to test generalizability to other older populations.

Although the study sample was of adequate size to obtain good statistical power, the participants were volunteers, and we did not choose them randomly; consequently, the results could be inconsistent across studies. Therefore, the results would need to be replicated in other samples of older adults to confirm them.

Moreover, given the relatively low BPAQ-SF scores, it is questionable whether actual aggressiveness was captured in this study. Thus, it is recommended to replicate the study with samples of older people with noticeable aggressive behaviors assessed by others. Nonetheless, it should be noted that the amount of variation in BPAQ-SF scores suggests heterogeneity, indicating the presence of aggressiveness in our sample, so that the relationships between the variables in our study are not undermined.

Self-reported responses were used, which are prone to recall bias and under-reporting due to social desirability bias. Therefore, other sources, such as multiple informants and/or observational data, could help avoid common method variance. Focus groups could also be a complementary qualitative methodology, by providing access to participants' own language, thoughts, and concerns (Wilkinson, 1998) about aggressiveness.

A limitation of mediation analysis is that it is correlational; confirmation from factorial experiments manipulating mediators would be sounder, though problematic to apply in practice (MacKinnon, 2012). Nevertheless, the results are consistent with previous evidence and the theoretical review.

Conclusions

Our findings enhance and extend the results of previous studies to older adults by showing that aggressiveness could be better understood by taking into account the role of self-regulation. Our data suggest that interventions aimed at improving older people's emotional knowledge and complexity may enable them to regulate impulsivity and their emotions better and, in turn, reduce aggressiveness. Therefore, mindfulness-based psychotherapies could be helpful, as they improve awareness of present experiences and emotion regulation and decrease emotional problems (Kishita et al., 2016). Mentalization-based psychotherapy is another possibility, as it is intended to improve the notion of oneself and others, implicitly and explicitly (Bateman & Fonagy, 2010).

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Conflict of interest

The authors have no conflicts of interest to declare.

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