STUDIA DOCTORALIA
PSYCHOLOGY AND EDUCATIONAL SCIENCE

UNIVERSITY OF BUCHAREST
VIRTUTE ET SAPIENTIA

STUDIA DOCTORALIA. PSYCHOLOGY AND EDUCATIONAL SCIENCE

VOLUME XV, NUMBER 1 **MAY 2024**

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EDITORIAL

Artificial Intelligence and Psychology

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https://doi.org/10.47040/sdpsych.v15i1.167

Artificial intelligence (AI) and psychology are two seemingly different fields, but their convergence has generated fertile ground for innovation and development. Authors such as John McCarthy (McCarthy, 1955), considered one of the pioneers of AI, and Marvin Minsky (Minsky, 1968), have highlighted the intersection of these domains, anticipating the profound impact that technology will have on human psychology.

John McCarthy's 1955 proposal for the Dartmouth summer research project on artificial intelligence marked the beginning of the systematic study of artificial intelligence, and his conclusions paved the way for the development of algorithms and fundamental concepts in AI. Marvin Minsky's work on semantic information processing highlighted the importance of mental modeling and neural networks in artificial intelligence. Sherry Turkle (2011) investigated how human relationships are influenced and transformed by the use of technology and robots in social interactions, highlighting the social and psychological impact of human-computer interaction, showing both the benefits and risks associated with the use of technology in interpersonal relationships, and emphasizing the need for a balanced approach in this regard.

AI has made significant progress in recent decades, enabling the development of applications that mimic human cognitive functions (LeCun et al., 2015). Using machine learning models and neural networks, technology has made a significant contribution to fields such as medical diagnosis, voice assistance, or even interventions for mental health (Orrù et al., 2020).

For example, various studies have highlighted how virtual reality and AI can be integrated to provide innovative therapies for post-traumatic stress disorders and anxiety (Lobel & Beidel, 2015; Rizzo et al., 2019). Other studies (Nass & Brave, 2005; Turkle, 2011) have explored how robots and virtual assistants can serve as emotional support, demonstrating the ability of artificial entities to create emotional bonds with humans and to serve as companions for those who are lonely or socially isolated.

As AI becomes increasingly sophisticated, its potential to assist and complement human psychological processes becomes increasingly evident (Yuste et al., 2017).

The role of artificial intelligence in improving therapeutic interventions for children

In recent decades, artificial intelligence (AI) has captured the attention of the scientific community for its potential to improve therapeutic interventions, especially regarding the mental health of children, ranging from the use of virtual reality for treating anxiety disorders to technology-assisted assistance in therapy for children with autism.

The benefits of using artificial intelligence in therapy include: 1. Personalized interventions: the use of machine learning algorithms allows for the adaptation of therapeutic interventions to the specific needs of each child (Rizzo et al., 2019). By analyzing data and behavior, AI can provide therapists with detailed information for customizing treatment; 2. Technology-assisted therapies: Virtual reality and interactive technology provide innovative tools for treating mental disorders in children (Lobel & Beidel, 2015). Technology-assisted therapies can be more engaging and attractive to children, facilitating progress in therapy; 3. Augmentation of therapist capabilities: AI can assist therapists in evaluating and analyzing data, providing additional support in decision-making processes and monitoring patient progress (Orrù et al., 2020).

Albert Rizzo and his colleagues have demonstrated the effectiveness of virtual reality in treating post-traumatic stress disorders in children (Rizzo et al., 2019). The results showed a reduction in symptoms and an improvement in the quality of life for children involved in technology-assisted therapy.

Other authors have conducted studies on the effectiveness of technology-assisted therapy in managing anxiety in children with autism spectrum disorders (Lobel & Beidel, 2015). The results showed a significant reduction in symptoms and an improvement of social skills in these children.

The use of artificial intelligence in therapy for children can be an efficient way to improve their mental health, as it combines knowledge from both fields to create personalized and effective therapies for children.

Ethical dilemmas in the use of artificial intelligence in applied psychology

The integration of artificial intelligence (AI) into the field of applied psychology has brought significant benefits, but has also raised complex ethical dilemmas. The development of AI technologies for diagnosis, therapy, and psychological data analysis has raised concerns regarding confidentiality, fairness, and the impact on the therapeutic relationship.

The use of AI in the collection and analysis of psychological data raises concerns about the confidentiality and security of personal information (Barocas & Selbst, 2016), as the protection of patient data and the avoidance of the risk of identification must be considered. The presence of bias in algorithms, which can perpetuate discrimination or social inequalities, is another major ethical concern (Angwin et al., 2016). Additionally, the use of AI can influence the therapeutic relationship between therapist and patient (Davenport & Kalakota, 2019), and the quality and intimacy of the therapeutic relationship may be affected.

Therefore, a balanced approach and clear regulations are necessary to ensure both real benefits and patient protection (Floridi et al., 2018). Interdisciplinary collaboration between professionals in the fields of psychology and technology is essential for developing ethical guidelines and ensuring responsible practice in this field.

Limitations and challenges of artificial intelligence in applied psychology

Despite significant progress, there are certain challenges and constraints that must be considered for an effective and ethical integration of artificial intelligence (AI) into psychological practice.

One of the greatest challenges is the limited ability of AI to understand and adapt to the complexity of the human context (Davenport & Kalakota, 2019). The lack of ability to interpret emotional subtleties and to flexibly respond to varied situations is a significant limitation in the therapeutic process.

While AI can simulate human behaviors to some extent, the lack of empathy and intuition remains a major limitation (Floridi et al., 2018). Subtle human abilities, such as reading non-verbal cues or adapting to individual needs, are difficult to replicate in an authentic manner.

Psychologists bring to therapy skills such as empathy, intuition, and the ability to establish deep human connections (Gilovich et al., 2015). These aspects are essential in facilitating the healing and personal transformation process in therapy. In this context, AI can be considered a complementary partner to psychologists (Duan & Xia, 2020). Technology can provide tools and support for data analysis, progress monitoring, and even for facilitating access to mental health services.

The accuracy and precision of diagnosis are essential in applied psychology, and AI may encounter difficulties in obtaining precise diagnoses (Duan & Xia, 2020). There is a risk that algorithms may misinterpret certain signals or provide inaccurate diagnoses due to the lack of context and detailed information.

Moreover, AI applications in psychology require constant human supervision to ensure that the decisions and recommendations of the algorithms are correct and ethical (Floridi et al., 2018). The lack of human involvement can lead to unintended consequences or misinterpretations of algorithmic results.

The adoption and implementation of AI technology in clinical practice require significant resources and may face resistance from mental health professionals (Duan & Xia, 2020). At the same time, integrating technology in a way that brings real benefits to patients and therapists requires time and adaptation.

All these limitations should not be seen as insurmountable obstacles, but as aspects that require careful approaches and clear regulations (Jobin et al., 2019). A balanced approach between technology and human intervention can bring significant benefits to psychological practice.

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The role of workaholism and perfectionism in the relationship between self-esteem and life satisfaction

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ARTICLE INFO

Article history:
Received 22-January-2024
Accepted 31-March-2024
Available online 01-May-2024

This article should be cited as: Frîncu, Ș. D. (2024). The role of workaholism and perfectionism in the relationship between self-esteem and life satisfaction. *Studia Doctoralia. Psychology and Educational Science, 15*(1), 4-13. https://doi.org/10.47040/sdpsych.v15i1.168

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ABSTRACT

The present study aims to investigate the role of workaholism and perfectionism in the relationship between self-esteem and life satisfaction. The study was attended by 125 people aged between 20 and 60, M = 38.40, AS = 12.67, of which 39 men (31%), 85 women (68%), and a participant of another gender (1%). The instruments used were the Rosenberg's Self-Esteem Scale (Rosenberg, 1965), the Satisfaction With Life Scale (Diener et al., 1985), the Dutch Work Addiction Scale (Taris & Schaufeli, 2003), the Perfectionism scale from IPIP-Ro (Iliescu et al., 2015). The results showed that self-esteem is a significant positive predictor of life satisfaction, but workaholism and perfectionism did not moderate the relationship between the two variables. The practical implications of the study were discussed, the ones for the research field in particular: highlighting the necessity of further studies on variables that moderate the relationship between self-esteem and life satisfaction; adapting psychological interventions regarding the chosen constructs to the cultural specificity of the Romanian population.

Keywords: *workaholism, perfectionism, self-esteem, life satisfaction*

1. INTRODUCTION

In this article, we investigated the role of workaholism and perfectionism in the relationship between self-esteem and life satisfaction. The motivation behind the topic, as well as the contribution that the present study brings to the literature, is to explore the variables that might intervene in the relationship between self-esteem and life satisfaction. In addition, there is also the motivation to examine workaholism and perfectionism from a clinical point of view. Scientific literature provides insights about these constructs mainly related to organisational contexts, but as shown, they are also linked to emotional struggles that can be more closely addressed from a clinical perspective. The present

study explores them in a clinical context, examining their influence on the relationship in a sample that is not selected only from organisational settings.

The topic of this study is relevant to the scientific literature because it addresses the way these constructs manifest themselves in the Romanian population. The lack of differentiation between collectivist and individualist cultures when comes to the relationship between self-esteem and satisfaction with life has been mentioned many times in the literature. This aspect reveals the importance of the present study for the adaptation of psychological interventions regarding the studied constructs to the cultural specificity of the Romanian population. It also helps in understanding the constructs in this cultural framework.

Self-esteem

Self-esteem reflects someone's subjective evaluation of their worth, excluding external opinions (Orth & Robins, 2014). Positive self-esteem involves self-acceptance without grandiosity, while negative self-esteem involves self-rejection and dissatisfaction, predicting antisocial behavior and depression in youth (Ackerman et al., 2011; Erol & Orth, 2011; Rosenberg, 2015).

Self-esteem fluctuates in adolescence due to various changes, but generally peaks between ages 50 and 60 before declining because of health, cognitive abilities, and socioeconomic status degradation (Bolognini et al., 1996; Orth et al., 2012).

Literature mentions many individual differences that have to be taken into consideration when discussing the development of self-esteem, such as gender (Twenge & Campbell, 2001), personality traits (Robins et al., 2001), attachment styles (Schmitt & Allik, 2005), self-efficacy (Erol & Orth, 2011), risk-taking (Erol & Orth, 2011; Wild et al., 2004), state of health (Erol & Orth, 2011; Reitzes & Mutran, 2006), etc.

Self-esteem that is highly dependent on external factors is considered maladaptive, as it shows that the individual does not feel a fundamental confidence in his or her worth (Orth & Robins, 2014). This changes as the person matures (Meier et al., 2011). More specifically, self-esteem fluctuates less as the person progresses from adolescence to adulthood, so it is less dependent on external events (Meier et al., 2011).

Other researchers have questioned whether self-esteem remains stable over time and if it is more similar to intelligence or core personality traits (Orth & Robins, 2014). Studies have shown that we tend to build a foundation that resists in front of the successes and failures we experience, as well as other external factors (Orth & Robins, 2014).

A question that divides the scientific literature into very different views on self-esteem is whether it is only a social construct that arises in individualistic cultures or whether it is a universally valid one that also includes collectivist cultures (Schmitt & Allik, 2005). Another layer of this issue is whether positive self-esteem is more specific to individualistic cultures, while collectivistic cultures are more likely to gather individuals with negative self-esteem (Schmitt & Allik, 2005). The present study helps in completing the overall picture on self-esteem and cultural differences by closely examining how this construct looks like in the Romanian population.

Satisfaction with life

Satisfaction with life is a key component of subjective well-being (Diener et al., 1985) and has become increasingly researched with the development of positive psychology, which postulates that mental health should be understood not only as the absence of psychopathology but also as the presence of factors that facilitate it (Seligman & Csikszentmihalyi, 2000).

Life satisfaction is considered the cognitive side of the construct, referring to the individual's judgments of his or her life (Diener et al., 1985). These judgments are subjective, as individuals evaluate their lives using internal criteria, not externally imposed ones (Diener et al., 1985).

Taking these perspectives into account, a theoretical model relevant to the topic of the study is "the dynamic equilibrium model", which explores how adaptability might interfere with someone's judgments regarding life satisfaction (Pavot & Diener, 2008). What the model emphasises is that life events may have a short-term influence on subjective well-being, but the person adapts to their new life circumstances and returns to the baseline level of subjective well-being that they had before the event occurred (Pavot & Diener, 2008). However, some events can have lasting effects (Lucas et al., 2003).

Research conducted in The Netherlands showed that top-down effects could be observed: 38% of the variance was explained by heritability and the rest by the individual's unique environment, so top-down factors influence life satisfaction (Pavot & Diener, 2008).

The present study provides an opportunity to investigate the construct in a Romanian population sample.

The relationship between self-esteem and life satisfaction

Self-esteem is a strong predictor of life satisfaction (Diener & Diener, 1995). Research conducted on adolescents showed that those who reported high life satisfaction had higher hope, self-esteem, and internal locus of control, but also lower scores on social stress, anxiety, depression, and negative attitudes towards teachers (Gilman & Huebner, 2006).

Further, the literature debates whether self-esteem and life satisfaction are distinct constructs since both are global evaluations (Diener & Diener, 1995). A cross-cultural study confirmed that they are because they correlated differently

across genders and nations (Diener & Diener, 1995). The cross-cultural study also mentioned the debate on differences in self-esteem between individualistic and collectivistic cultures, so the present study examines the relationship between self-esteem and life satisfaction in a sample of Romanian population, which contributes to a deeper understanding of the issue from a cultural point of view.

Considering the above, we propose to analyze the relationship between self-esteem and life satisfaction, and we formulate the following hypothesis:

H1. *Self-esteem is a significant positive predictor of life satisfaction*.

Workaholism

Workaholism is defined by a strong involvement in work, and it is considered an addiction similar to alcoholism because in both cases individuals sacrifice other interests, interpersonal relationships, and their health status, rather than giving up their addiction (Porter, 1996; Spence & Robbins, 1992). Spence and Robbins (1992) expressed that workaholism is characterized by three essential properties: high engagement in work, a strong inner drive to work, and a lack of enjoyment while working. However, these properties can overlap, for example, some people may still enjoy their work even though they meet other criteria (Spence & Robbins, 1992).

There are three types of workaholics: compulsive-dependent workaholics (they experience work as an addiction or compulsion), perfectionist workaholics (they have a preoccupation with details, rules, lists, and a desire to win at all costs), and achievement-oriented workaholics (they display characteristics of Type A personality, a desire for upward mobility and achievement motivation) (Scott et al., 1997).

Therefore, there are several perspectives on workaholism, but its addictive nature is a key feature, especially for the subject of this paper which brings into question the moderating role of the construct in the relationship between self-esteem and life satisfaction.

Perfectionism

Perfectionism has long been seen as pathological, implying cognitive dysfunction characterized by dichotomous thinking, overgeneralization, and imperative attitude (Brown & Beck, 2002), but this perspective is reductionist, as adaptive aspects of this construct have also been identified (Terry-Short et al., 1995). Adaptive perfectionism focuses on strengths, positive outcomes, and positive rewards received because of perfectionistic behaviour – an example is found among athletes because they set high standards for themselves without excessive self-criticism (Burns et al., 2012; Rice & Ashby, 2007; Terry-Short et al., 1995). On the other hand, negative, neurotic perfectionism is a personality trait that is more related to fear of failure and avoidance of negative rewards (Burns et al., 2012), expressed by setting unrealistically high goals, a tendency that may originate from early environments characterized by inconsistency and conditional positive approval (Terry-Short et al., 1995).

The unidimensional perspective, which referred only to the pathological nature of perfectionism, was maintained for a long time because perfectionism is a specific characteristic of many psychopathologies (Shafran et al., 2002), such as bulimia nervosa and anorexia nervosa (Lilenfeld et al., 2000; Shafran et al., 2002) or obsessive-compulsive personality disorder (Diedrich & Voderholzer, 2015). Furthermore, a study conducted to analyze the relationship between therapeutic alliance and perfectionism in depression treatment outcomes showed that in patients with low perfectionism scores the contribution to the therapeutic alliance increased consistently, while for high perfectionistic patients, it did not during treatment (Zuroff et al., 2000). Thus, it can be understood that perfectionism can hinder the effectiveness of treatment for depression (Zuroff et al., 2000).

The multidimensional perspective, for which the MPS scale ("Multidimensional Perfectionism Scale") was developed, takes into account several facets of perfectionism, more specifically: self-oriented perfectionism (high standards by which the person evaluates themselves), other-oriented perfectionism (high expectations that the person has from others) and socially prescribed perfectionism (the belief that important people in their life expect them to be perfect in order to accept them) (Hewitt et al., 1991).

Therefore, considering the aspects discussed above, we agreed that it would be relevant to investigate the moderating role that perfectionism has in the relationship between self-esteem and life satisfaction.

The role of workaholism and perfectionism in the relationship between self-esteem and life satisfaction

Scientific literature mentions no direct examination of the relationships between variables similar to this model, but there is close research on how the chosen variables interact that constitutes the theoretical basis for understanding the present study, which is why they will be presented in this section.

Next, we will describe the choice of the two moderators and how they have been understood in the literature. Over time, interactions between the two variables have been observed (Spence & Robbins, 1992). For example, perfectionism could be a risk factor for workaholism or workaholism mediates the relationship between perfectionism and burnout (Taris et al., 2010), but the literature is still limited in explaining what might be responsible for the relationship between the two (Stoeber et

al., 2013). Furthermore, certain dimensions of perfectionism may be related to dimensions of workaholism (Clark et al., 2010). For example, the characteristic of perfectionism called discrepancy (the difference between the extreme expectations that the person has of themselves and the self-evaluation of current performance) can create intrusive thoughts related to work, which are also specific to workaholism (Clark et al. al., 2010).

Regarding their choice in this study, even if there are workaholic-perfectionists, the conceptual distinction between workaholism and perfectionism is made by the origins of the two constructs. Thus, the origins of perfectionism may be related to neuroticism, fear of failure, a family history of conditional positive acceptance, and the neurotic desire to please the ones close to them (Burns et al., 2012; Enns & Cox, 2002; Terry -Short et al., 1995), while workaholism is addictive and a form of escape from the difficult aspects of life - the workaholic works excessively to avoid looking at his own emotions and to stay away from intimacy (Minirth et al. al., 1985; Seybold & Salomone, 1994). Given these conceptual differences and the fact that both constructs affect many aspects of someone's life, this study aimed to observe how strong their influence is when they both manifest themselves in the relationship between self-esteem and life satisfaction.

Researchers have tried to identify the factors behind workaholism, this internal pressure to work excessively, and by association with what is known about people addicted to alcohol, it seems that behind work addiction there is also a problem related to identity (Porter, 1996). Therefore, one of the possible causes that push a person to be a workaholic could be negative self-esteem (Porter, 1996), which underlines the existence of some relationships between the variables of this study. Furthermore, researchers have shown that there is a reciprocal relationship between job satisfaction and overall life satisfaction, so compulsive-dependent workaholics may experience reduced life satisfaction (Scott et al., 1997).

Furthermore, we will discuss both adaptive and maladaptive dimensions of perfectionism and how they interact with the other variables of this study. Maladaptive perfectionists experience strong feelings of inferiority, tend to underestimate their successes, experience failure as devastating, and their self-esteem tends to be negative (Rice & Dellwo, 2002). Because self-esteem strongly correlates with life satisfaction, and there is a link between maladaptive perfectionism and negative self-esteem, we expect perfectionism to moderate the relationship between self-esteem and life satisfaction, which is the reason for choosing this model of research in the present study. Regarding adaptive perfectionism, one study showed that people who display this characteristic manifest self-esteem, academic and social integration similar to those of non-perfectionists, but they experience more symptoms of depression than them (Rice & Dellwo, 2002). Plus, the study showed that adaptive perfectionists and non-perfectionists exhibit significantly higher levels of positive self-esteem than individuals who exhibit maladaptive perfectionism (Rice & Dellwo, 2002). Thus, because there is a link between positive self-esteem and adaptive perfectionism, and self-esteem correlates with life satisfaction, there is a possibility that perfectionism moderates the relationship between self-esteem and life satisfaction. Moreover, life satisfaction represents a self-evaluation that people make regarding their own lives according to some subjective standards (Diener et al., 1985), and from this point of view it resembles perfectionism – an evaluation of someone's performance according to some self-imposed standards (Çapan, 2010). Therefore, the individual's ability to achieve self-imposed standards increases life satisfaction, but when the discrepancy between the results that the person expects to achieve and what he actually achieves is large, life satisfaction decreases (Çapan, 2010).

Considering the above, we propose to analyze the moderating role of workaholism and perfectionism in the relationship between self-esteem and life satisfaction, so we formulate the following hypotheses:

H2. *Workaholism moderates the relationship between self-esteem and life satisfaction*.

H3. *Perfectionism moderates the relationship between self-esteem and life satisfaction*.

2. METHODOLOGY

Participants and procedure

A number of 125 people aged between 20 and 66 years, M = 38.40, SD = 12.67 participated in the present study, of which 39 men (31%), 85 women (68%), and one participant of another gender (1 %). Regarding the area of origin, 45 participants come from the rural area (36%) and 80 from the urban area (64%). Regarding the level of education, two graduated general school (2%), 39 graduated high school (31%), and 84 graduated university (67%). Regarding occupational status, 13 are employed part-time (10%) and 112 are employed full-time (90%). Regarding the period since they have been employed, there are 14 participants between 6 months and 1 year (11%), 12 participants between 1 and 3 years (10%), 10 participants between 3 and 5 years (8%), 12 participants between 5 and 10 years (10%) and 77 over 10 years (61%). Regarding the type of job, 102 hold an operational position (82%) and 23 hold a management position (18%), and regarding marital status, 31 participants are single (25%), seven are divorced (6%), 21 are in a relationship (17%) and 66 are married (52%).

Inclusion criteria: participants must be currently employed and Romanian citizens over the age of 18. The sampling method is one of convenience. All 125 people agreed to participate until the end by completing the questionnaire (100%). The answers were collected using several social networks, where participants were invited to fill out a form lasting approximately 10 minutes. The questionnaire opened with a section where participants were informed about the general aspects of the research and signed the informed consent prior to completion.

The research ethics conditions regarding data processing and interpretation, as well as data security monitoring, were met. Data were initially organized in encrypted Excel spreadsheets to which only the author of this study had access. No participants' names or other data that could link the participant's identity to the data provided by them were requested.

Instruments

Sociodemographic variables were collected through a list of questions regarding gender, age, background, education level, marital status, occupational status, work experience, and type of job currently held.

Self-esteem was measured with Rosenberg's Self-Esteem Scale (Rosenberg, 1965). The instrument includes 10 items, and the scale is summative. Answers are given on a four-point Likert scale, where 0 means “strongly disagree” and 3 means “strongly agree”. The Cronbach Alpha coefficient for the entire scale is .88, which shows that the psychometric properties of the scale are acceptable (Gray-Little et al., 1997).

Life satisfaction was measured with The Satisfaction With Life Scale (Diener et al., 1985). The instrument includes 5 items, and the scale is summative. Answers are given on a seven-point Likert scale, where 1 means “strongly disagree” and 7 means “strongly agree”. The Cronbach Alpha coefficient for the entire scale is .87, which shows that the psychometric properties of the scale are acceptable.

Workaholism was measured with the Dutch Work Addiction Scale (Taris & Schaufeli, 2003). The instrument includes 20 items and measures two dimensions, "Working Excessively" and "Working Compulsively". Answers are given on a four-point Likert scale, where 1 means “(almost) never” and 4 means “(almost) always”. For the WE items, the scores are added and then divided by 9. For the WC items, the scores are added and then divided by 7. The Cronbach Alpha coefficient for the entire scale adapted to the Romanian population is .85, which shows that the psychometric properties of the scale are acceptable.

Perfectionism was measured with the Perfectionism scale ("Perfectionism"), from the IPIP-Ro (Iliescu et al., 2015). The instrument includes nine items, it is adapted for the Romanian population, and the scale is summative. Answers are given on a five-point Likert scale, where 1 means “strongly disagree” and 5 means “strongly agree”. The Cronbach Alpha coefficient for the entire scale adapted to the Romanian population is .71, which shows that the psychometric properties of the scale are acceptable.

3. RESULTS

The present study has a cross-sectional, descriptive, correlational design. The Jamovi statistical analysis program, including the medmod module, was used for data organization and hypothesis testing (The jamovi project, 2023).

Descriptive statistics

Means, standard deviations, internal consistency coefficients, and correlations between variables are shown in Table 1. AII scores are high, respectively for workaholism, M = 52.19, SD = 12.45, for perfectionism, M = 34.45, SD = 6.12, for self-esteem, M = 21.45, SD = 5.72, and for life satisfaction, M = 25.26, SD = 7.17.

There are significant positive correlations between workaholism and perfectionism, $r = .28$, $p < .01$, between perfectionism and life satisfaction, $r = .30$, $p < .01$, and between self-esteem and life satisfaction, $r = .54$, $p < .01$. Also, self-esteem correlates significantly negatively with workaholism, $r = -.23$, $p < .01$.

Skewness and kurtosis values range between (-1, 1) and reflect a normal data distribution. There were no missing cases and no cases were removed from any of the statistical analyses.

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Table 1. *Descriptive statistics*

	M	SD	α	WK	P	SS	SW
WK	52.19	12.45	.91	1			
P	34.45	6.12	.81	.28**	1		
SS	21.45	5.72	.85	-.23**	.08	1	
SW	25.26	7.17	.93	.07	.30**	.54**	1

Note: **. $p < .01$.

WK - workaholism, P – perfectionism, SS – self-esteem, SW – satisfaction with life

Hypotheses testing

H1. *Self-esteem is a significant positive predictor of life satisfaction*.

To test this hypothesis, a simple linear regression analysis was performed, with self-esteem as the predictor and life satisfaction as the dependent variable.

Table 2. *Simple linear regression analysis for self-esteem as a predictor of life satisfaction*

						95%CI	
Predictor	**Estimate**	**SE**	**t**	**p**	**β**	**Lower**	**Upper**
SS	.68	.09	7.15	< .001	.54	.39	.69

Note: R^2 = .29
SS – self-esteem

Self-esteem is responsible for 29% of the variation in life satisfaction, the regression equation being statistically significant, F(1,123) = 51.19, p < .01. Self-esteem is significantly and positively associated with life satisfaction, β = .54, CI95%(.39, .69), p < .01.

Considering this result, we can say that hypothesis H1 is supported by the analyzed data.

H2. *Workaholism moderates the relationship between self-esteem and life satisfaction*.

To test this hypothesis, a moderation analysis was performed, with self-esteem as the predictor, life satisfaction as the dependent variable, and workaholism as the moderating variable.

Table 3. *Moderation estimate for workaholism between self-esteem and life satisfaction relationship*

			95%CI			
	Estimate	**SE**	**Lower**	**Upper**	**Z**	**p**
SS	.76	.09	.58	.94	8.35	.00
WK	.12	.04	.04	.21	3.01	.00
SS ✻ WK	-.01	.01	-.03	.00	-1.70	.09

Note: WK - workaholism, SS – self-esteem

It is observed that workaholism is not able to moderate the relationship between self-esteem and life satisfaction, b = -.01, CI95%(-.03,.00), z = -1.70, p = .09.

Considering this result, we can say that hypothesis H2 is not supported by the analyzed data.

H3. *Perfectionism moderates the relationship between self-esteem and life satisfaction*.

To test this hypothesis, a moderation analysis was performed, with self-esteem as the predictor, life satisfaction as the dependent variable, and perfectionism as the moderating variable.

Table 4. *Moderation estimation for perfectionism in the relationship between self-esteem and life satisfaction*

			95%CI			
	Estimate	**SE**	**Lower**	**Upper**	**Z**	**p**
SS	.64	.09	.46	.81	7.18	< .001
P	.34	.08	.18	.50	4.09	< .001
SS ✻ P	.02	.01	-.00	.05	1.79	.074

Note: P - perfectionism, SS – self-esteem

It is observed that perfectionism fails to moderate the relationship between self-esteem and life satisfaction, b = .02, CI95%(-.00,.05), z = 1.79, p = .07.

Considering this result, we can say that hypothesis H3 is not supported by the analyzed data.

4. DISCUSSION

The purpose of this study was to investigate the role of workaholism and perfectionism in the relationship between self-esteem and life satisfaction in a Romanian population sample. In terms of descriptive analysis, participants scored relatively high on workaholism, very high on perfectionism and self-esteem, and high on life satisfaction.

The first hypothesis was supported by the results. Self-esteem is indeed a significant positive predictor of life satisfaction. Existing literature supports it as well. For example, a cross-cultural study showed that self-esteem is a strong predictor of life satisfaction but emphasized that the results should not be extrapolated without differentiating between individualistic and collectivistic cultures (Diener & Diener, 1995). In the present study, we can see how the two constructs interact in the Romanian population, a population that after the 1989 Revolution became an individualist one. In a study investigating the Big Five personality traits and self-esteem as predictors of life satisfaction in a population sample from Iran, it was also observed that self-esteem is strongly correlated with life satisfaction and that it may even mediate the influence that conscientiousness and agreeableness have on life satisfaction (Joshanloo & Afshari, 2011). The results of the present study are supported by the literature for different age groups as well. For example, a study that investigated variables in an adolescent sample, a population that is not part of the present study, showed that adolescents with high levels of life satisfaction also scored significantly higher on self-esteem, compared to youth who reported average life satisfaction (Gilman & Huebner, 2006).

The second hypothesis was not supported by the analyzed data, thus, in the present study, workaholism fails to moderate the relationship between self-esteem and life satisfaction. In the specialized literature, there are no studies that analyze the relationships between these variables according to the model presented in this study, but certain results can support the choice of studying workaholism as a moderator in the relationship between the two constructs. It has been shown that workaholism can be caused by negative self-esteem (Porter, 1996), but also that it can affect life satisfaction (Scott et al., 1997). Furthermore, there are studies which show that in countries where participants score low on self-esteem, life satisfaction is low as well (Diener & Diener, 1995). From these ideas, it can be assumed that workaholism could play a moderating role in the relationship between self-esteem and life satisfaction. The fact that in the present study, the influence of the moderator was not a significant one may suggest that some other more significant variables or mechanisms moderate this relationship (Zedeck, 1971), but those are very little studied so far (Liang et al., 2020). Another possible explanation could be that the standards by which individuals evaluate themselves or their lives are related to many aspects, and work relationship is only one of them. On the other hand, the sample is one of convenience and there is a possibility that the respondents who completed the questionnaire did not show a high level of workaholism.

The third hypothesis, according to which perfectionism moderates the relationship between self-esteem and life satisfaction, was not supported by the data analyzed. This could mean that the moderating effect of perfectionism is not significant for the relationship between the global variables. There is evidence in the literature that perfectionism can both positively and negatively influence someone's self-esteem (Rice & Dellwo, 2002) and that, depending on someone's ability to meet self-imposed standards, life satisfaction can increase or decrease. decreases (Çapan, 2010). Given these aspects and the fact that self-esteem is a predictor of life satisfaction, the possibility that perfectionism is a moderator in the relationship between self-esteem and life satisfaction was an important aspect to analyze. On the other hand, perfectionism as a moderator was not significant in this study, which may mean that there are variables that moderate the relationship more strongly, variables that may be related to other areas of an individual's life.

Practical implications of the study

This study highlights the fact that further research on exploring variables that moderate the relationship between self-esteem and life satisfaction is needed, as research on this topic is currently limited.

In addition, from a cultural point of view, the way in which the researched variables interact is important to be observed in the future because Romania is still adapting to the changes produced by the transition from a collectivist to an individualist culture, and a part of the variables are influenced by the type of culture.

Limits and future research directions

One of the limitations of the study is the use of self-report instruments. Participants can give answers that they consider desirable, which do not reflect their internal reality (Adler & Fagley, 2005). Moreover, they can only show as much as they know about themselves (Adler & Fagley,

2005). Another difficulty that can arise is that participants may not accurately remember how they behaved in certain situations or how they felt at a certain time (Adler & Fagley, 2005). The scales with which we measured workaholism and life satisfaction do not contain reversed items, which reflects that to some extent this study lacks control of this bias. In our future research, we will consider using instruments that contain reversed items so that the validity of the study is not affected by methodological aspects.

Also, some authors argue that it is extremely difficult to identify moderator effects in non-experimental studies (Morris et al., 1986; Zedeck, 1971). Thus, the design of this study could be a limitation. A future direction would be to choose a design that allows greater control over the variables.

Another limitation could be the fact that the sample was not representative – convenience sampling and the online distribution of the questionnaire could be barriers in this matter. Therefore, there is a possibility that the invitation to complete the questionnaire did not reach environments where there are extremely workaholic people (understanding workaholism as an addiction) or strong perfectionists. To address this limitation, a future direction is to share the questionnaire on as many different platforms as possible, not only social media.

Moreover, another limitation could be that many participants were in the developmental stage called maturity (40-65 years old), which is characterized by the developmental crisis of generativity vs. stagnation (Erikson & Erikson, 1998) – more specifically, 62 out of 125 participants. Given that older adults generally report higher life satisfaction than young adults (Adams-Price et al., 2018), their overrepresentation may bias research findings. Also, the participants from the urban environment were much more numerous, 80 out of 125 participants. These aspects may represent limits in the generalization of the results. As a future direction, stratified random sampling can be used to ensure that different subgroups of the population are proportionally represented in the final sample.

Conclusions

The present study aimed to investigate the role of workaholism and perfectionism in the relationship between self-esteem and life satisfaction. While self-esteem was found to positively predict life satisfaction, neither workaholism nor perfectionism moderated the relationship. Further, the study focused on identifying boundaries that may have prevented significant effects of the moderators from manifesting. Future studies could make improvements when comes to the instruments chosen, the control of variables, the sampling method used, and sharing the invitation to participate in more varied environments. The implications of the study are particularly relevant for the field of research, inviting a more in-depth analysis of the variables that moderate the relationship between self-esteem and life satisfaction, but also by revealing how the interaction between the variables looks in the Romanian population. Therefore, the present study brings new perspectives to the specialized literature regarding the role of workaholism and perfectionism in the relationship between self-esteem and life satisfaction, in a sample of the Romanian population. .

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STUDIA DOCTORALIA
PSYCHOLOGY AND EDUCATIONAL SCIENCE
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VIRTUTE ET SAPIENTIA

The Role of Aging Anxiety and Personality Traits in the Relationship Between Age-related Discrimination and Life Satisfaction in Middle-Aged Individuals

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ARTICLE INFO

Article history:
Received 8-February-2024
Accepted 29-April-2024
Available online 01-May-2024

This article should be cited as: Trică, A. (2024). The Role of Aging Anxiety and Personality Traits in the Relationship Between Age-related Discrimination and Life Satisfaction in Middle-Aged Individuals. *Studia Doctoralia. Psychology and Educational Science, 15(1),* 14-22. https://doi.org/10.47040/sdpsych.v15i1.169

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ABSTRACT

This study aimed to investigate the extent to which aging anxiety not only predicts lower levels of life satisfaction, but also explains the relationship between age-related discrimination and life satisfaction. The sample comprised 391 individuals, aged 35 – 90 years old. To address the research objective, a quantitative survey was administered, encompassing the Fraboni Scale of Ageism, the Satisfaction with Life Scale, 10 items from the Aging Anxiety Scale, the Emotional Stability Scale from the International Personality Item Pool, and the Job Demands-Resources Questionnaire. The findings revealed that the perception of age-related discrimination was not associated with either life satisfaction or aging anxiety. Instead, aging anxiety was negatively associated with life satisfaction. These findings are in line with existing literature, supporting that aging anxiety has a range of negative consequences (Bodner et al., 2021; Carrard et al., 2021; Ramírez & Palacios-Espinosa, 2016). The results contribute to a better understanding of the role of aging anxiety in interventions aimed at improving well-being in older individuals.

Keywords: *aging anxiety, personality traits, age-related discrimination, life satisfaction*

1. INTRODUCTION

The impact of aging and attitudes toward aging has rarely been investigated in the context of adulthood, even though existing studies suggest that perceived age-related discrimination is a phenomenon experienced by young adults as well (Chasteen et al., 2021), not just older adults. Furthermore, age-related discrimination is associated with numerous negative consequences, including reduced employment opportunities, career prospects (Abrams et al., 2016), limited access to healthcare services (Robb et al., 2002), and other goods and services (Chasteen et al., 2021).

Studies have shown that age-related discrimination is associated with death anxiety as well as aging anxiety (Popham et al., 2011), and this association becomes more pronounced as individuals age further (Bodner et al., 2015). These results suggest that the stereotypes about old age encountered by individuals can be internalized and attributed to oneself. When this occurs before reaching old age, the internalization of stereotypes takes the form of aging anxiety. Unsurprisingly, aging anxiety interferes with the acceptance of the aging process, with findings indicating that it is associated with heightened feelings of loneliness and depressive symptoms in adults (Bergman & Segel-Karpas, 2021; Ramirez & Palacios-Espinosa, 2016), negative self-image, and positive attitudes toward cosmetic surgery in women (Slevec & Tiggemann, 2010). Therefore, the present study aims to investigate an explanatory model of the relationship between age-related discrimination and well-being in adulthood.

However, not all individuals exposed to age-discriminatory social attitudes develop anxious expectations about aging. Although not consistent, the literature suggests that certain personality traits can act as sources of resilience or, conversely, as risk factors. The few results in this direction indicate positive associations of neuroticism and negative associations of agreeableness, conscientiousness, self-efficacy, and optimism with aging anxiety (Barnett & Adams, 2018; Harris & Dollinger, 2003; Jung & Oh, 2016). Among these, in the context of successful aging, optimism, self-efficacy, and neuroticism have been most often considered (Carver & Buchanan, 2016; Friedman, 2019; Neupert et al., 2008; Ready et al., 2012). If they constitute facilitating factors for satisfactory aging, we would expect them to act as protective factors against the negative effects of aging anxiety. Thus, we will test whether personality traits moderate the indirect effect of discriminatory attitudes on life satisfaction in middle-aged individuals, through aging anxiety.

Age-related discrimination and life satisfaction in middle-aged individuals

The consequences of age-related discrimination make it important to address. The literature has identified numerous negative effects, especially regarding the mental and physical health of individuals affected by discrimination (Hu et al., 2021), well-being (Robertson, 2017), social functioning (Allan et al., 2014), and employability (Ahmed et al., 2012). Most of these studies have been conducted on samples of older individuals. However, age-related discrimination can occur before entering this stage of life. Far fewer studies have investigated how it affects the functioning of middle-aged individuals, given that they represent the first age category to enter the stage of senescence.

For example, Kim et al. (2019), in a study examining the mediating role of self-perceptions of aging and sense of life in the relationship between age-related discrimination and depressive symptoms, showed that age-related discrimination is indeed associated with depressive symptoms. This relationship is mediated by negative perceptions of aging, which affect the perception of life's meaning, subsequently contributing to increased levels of depression. Similar results were obtained by Bodner et al. (2021), who demonstrated that age-discriminatory attitudes on one day predict a distorted perception of one's own age (participants feeling older) and more pronounced depressive symptoms the following day. An analysis of the literature from 2015 highlighted the importance of positive perceptions of aging for well-being, even among middle-aged individuals (Westerhof & Wurm, 2015). Another possible mechanism for the relationship between the two was highlighted by Levy et al. (2012), with the study's results suggesting that individuals who report positive age-related stereotypes recover faster from disability, compared to those with negative attitudes. Thus, attitudes toward aging can influence life satisfaction through their effects on physical health as well.

Although a series of results support the idea that age-related discrimination can affect life satisfaction, few studies have been conducted on adults (rather than on older adults). Thus, the present study aims to investigate the extent to which discrimination affects life satisfaction in middle-aged individuals.

Aging Anxiety

Several theoretical models have aimed to explain the phenomenon of aging anxiety. The most widely used is Terror Management Theory (TMT; Greenberg et al., 1997), according to which the awareness of the inevitability of death exerts a strong influence on various aspects of people's thinking, motivation, emotions, and behaviors. Consistent with this theory, studies have shown that aging anxiety is frequently associated with death anxiety. For example, Benton et al. (2007) demonstrated that the fear of losses and changes in physical appearance predict tangible death anxiety, which refers to concerns about what happens to one's body when someone dies or immediately after death. Fear of losses also predicts existential death anxiety, meaning the fear of disappearance and annihilation (Benton et al., 2007).

The Socioemotional Selectivity Theory was also used to explain the phenomenon of aging anxiety (Carstensen, 1995). According to this theory, as people age, they become more aware of limited time and begin to prioritize emotional and social goals over other types of goals. They seek out contexts that provide satisfaction, preferring to dedicate their time primarily to close, established relationships that ensure positive emotional experiences, unlike younger adults who

are motivated by career or developmental goals and forming new relationships.

Regarding aging anxiety within the framework of Socioemotional Selectivity Theory, it is explained precisely through the lens of these relationships. Given their importance for the well-being of older individuals, the possibility of losing these relationships provokes a fear proportional to the role they play. This fear is likely triggered by the prospect of losing the social support system and associated positive feelings, as well as the risk of social disconnection or exclusion (Carstensen, 1995). In line with these premises, Ramírez and Palacios-Espinosa (2016) showed that higher expectations regarding receiving social support are associated with higher levels of anxiety, generated by the fear of losing it.

The Continuity Theory (Atchley, 1989) can also be used to explain aging anxiety, especially considering the strategies used to ensure continuity starting from middle age. It suggests that people manage to maintain coherence in their lives as they age by preserving behaviors, beliefs, and relationships from the past. In other words, the aging process is profoundly influenced by individuals' personal history (Atchley, 1989). Regarding aging anxiety, it can be explained by the Continuity Theory in two ways: either as an adapted form of anxiety from other life stages, now directed towards aging, or as a response to the disruption of life continuity through retirement, reduction, or loss of social relationships, declining abilities, etc. (Von Bonsdorff et al., 2009).

Taking into account the above, we formulate our first hypothesis:

H1. *Age-related anxiety mediates the relationship between perceived age-related discrimination and life satisfaction*.

Personality Traits

Among the personality traits frequently investigated in the context of aging are neuroticism, optimism, and self-efficacy (Carver & Buchanan, 2016; Friedman, 2019; Neupert et al., 2008; Ready et al., 2012). Given that these traits represent either risk factors or protective factors for successful aging, we expect them to influence the relationship between aging anxiety and satisfaction in middle age. However, no study has investigated the role of these traits in the age stage mentioned earlier, although identifying them could inform the development of early interventions and prevent a range of difficulties in later life.

Neuroticism has been identified as a vulnerability factor for numerous psychological and neurological disorders (DuPont et al., 2019), including depressive and anxiety disorders (Vinograd et al., 2020), eating disorders (Cervera et al., 2003), Parkinson's disease (Terracciano et al., 2021), as well as somatic conditions, especially cardiovascular ones (Marijnissen et al., 2014; Marušič & Eysenck, 2001). Regarding neuroticism in the context of aging, several studies have highlighted its relevance. Although a trend of decrease has been reported as individuals age (Friedman, 2019), it continues to play an important role in the process. For example, a longitudinal study showed that neuroticism predicts successful aging, in the sense that lower levels of neuroticism are associated with a better perception of aging (Heid et al., 2022). Furthermore, several studies have identified associations between neuroticism and aging anxiety. For instance, Harris and Dollinger (2003) demonstrated that aging anxiety in all its forms (related to health, loss, physical attractiveness) positively correlates with neuroticism. Similar results have been obtained by other authors, with the relationship between aging anxiety and neuroticism remaining significant regardless of age group or nationality (Gao, 2009). In the context of these findings, neuroticism appears to represent a vulnerability factor concerning how individuals age. Considering the stress-vulnerability model, we assume that stress generated by exposure to age-discriminatory attitudes leads to an increase in aging anxiety, and the effect of aging anxiety on life satisfaction in middle-aged individuals will be more pronounced in those with high levels of neuroticism.

Optimism has been frequently studied in the context of aging, especially due to its association with future orientation. Although, in old age, individuals tend to focus more on the present than the future, and optimism tends to decrease (Giltay et al., 2006), the ability to remain anchored in future perspectives can lead to functional behaviors (Lennings, 2000). In a longitudinal study that tracked the health behaviors of elderly individuals over 15 years, it was shown that those with higher levels of optimism engaged in more physical activity, were less likely to smoke, consumed more fruits and vegetables (Giltay et al., 2007), and had a reduced risk of dying from cardiovascular causes (Giltay et al., 2006). Psychologically, optimism is associated with a more positive outlook on aging, lower levels of depression (Weitzer et al., 2022), high well-being, and a sense of life purpose (Ju et al., 2013).

These results suggest that optimism remains an important source of resilience for both physical and psychological functioning even with advancing age. For this reason, we expect optimism to diminish the impact of age-related anxiety preceded by age-related discrimination on life satisfaction in middle-aged individuals.

Among the benefits of self-efficacy are: higher performance in various tasks (Multon et al., 1991), increased resilience in managing stressors (Jackson et al., 2014), better management of adverse experiences, with a reduced impact on mental health, etc. (Schönfeld et al., 2016). In the context of aging, few studies have considered the role of self-efficacy. For example, Tovel et al. (2019) showed that self-efficacy mediates the relationship between perceptions of aging and physical functioning in a sample of individuals

over 75 years old. Another study found that self-efficacy facilitates adaptation to old age, preventing depressive symptoms both directly and through social support (Holahan & Holahan, 1987). More recent results have shown similar outcomes, with self-efficacy being directly associated with well-being and quality of life in a group of people over 60 years old (Bagheri et al., 2022).

Given the benefits of self-efficacy, and considering that most studies regarding its benefits in the context of aging are limited, the present study aims to investigate the extent to which self-efficacy represents a protective factor, reducing the impact of age-related discrimination through age-related anxiety on well-being in middle-aged individuals.

Taking into account the above, we formulate our second hypothesis:

H2. *Personality traits (neuroticism, self-efficacy, and optimism) moderate the mediating effect of age-related anxiety on the relationship between perceived age-related discrimination and life satisfaction*.

2. METHODOLOGY

Participants and procedure

The study included 391 participants aged between 35 and 90, M = 58.53, SD 11.32. Of these, 315 (80.6%) participants identified as female and 76 (19.4%) participants identified as male; 251 (64.2%) were married, 81 (20.7%) were divorced, 43 (11%) were unmarried and 16 (4.1%) were widowed. In terms of education, 6 (1.5%) completed primary school, 86 (22%) completed high school, and 299 (76.5%) had higher education. Additionally, 146 (37.3%) participants were from rural areas, while 245 (62.7%) were from urban areas. All research participants provided informed consent.

Instruments

Perceived age-related discrimination was measured using the Fraboni Scale of Ageism (FSA; Fraboni et al., 1990). Nine items (e.g., "There should be special areas in fitness centers for older people where they can exercise at their own level.") assessed the extent to which respondents believed certain statements about how others view older adults to be true. Items were rated on a scale from 1 to 5, with 1 indicating complete disagreement and 5 indicating complete agreement.

Life satisfaction was measured using the Satisfaction with Life Scale (Diener et al., 1985), which consists of five items rated on a scale from 1 (strongly disagree) to 7 (strongly agree) assessing the cognitive aspects of subjective well-being. Respondents indicate the extent to which they are satisfied with their lives and how closely their lives resemble their ideal life (e.g., "In general, my life is close to my ideal.").

Aging anxiety was measured using 10 items from the Aging Anxiety Scale (Lasher & Faulkender, 1993), rated on a scale from 1 (strongly disagree) to 5 (strongly agree), capturing psychological concerns (e.g., "I'm afraid it will be very hard for me to find contentment in old age.") and fear of losses (e.g., "I'm afraid that when I'm old, all my friends will disappear.").

Neuroticism was measured using the Emotional Stability scale from the International Personality Item Pool (Goldberg et al., 2006; Iliescu et al., 2015), consisting of 10 items rated on a scale from 1 (strongly disagree) to 5 (strongly agree) (e.g., "I worry about many things.").

Self-efficacy was measured using the Job Demands-Resources Questionnaire (Bakker & Demerouti, 2014), comprising 4 items rated on a scale from 1 (strongly disagree) to 5 (strongly agree) (e.g., "Based on my resources, I can manage unexpected situations.").

Optimism was measured using the Job Demands-Resources Questionnaire (Bakker & Demerouti, 2014), consisting of 4 items rated on a scale from 1 (strongly disagree) to 5 (strongly agree) (e.g., "I usually expect the best in uncertain times.").

3. RESULTS

Descriptive statistics

The 391 participants had scores ranging from a minimum of 1 to a maximum of 4 for perceived age-related discrimination, M = 2.09, SD = .54. For life satisfaction, scores ranged from a minimum of 1 to a maximum of 7, M = 2.84, SD = 1.46. Aging anxiety scores ranged from a minimum of 2.20 to a maximum of 5, M = 3.24, SD = .49. Nevrotism scores ranged from a minimum of 1.50 to a maximum of 4.40, M = 2.66, SD = .71. Self-efficacy scores ranged from a minimum of 1.50 to a maximum of 5, M = 4.18, SD = .69. Lastly, optimism scores ranged from a minimum of 2.50 to a maximum of 5, M = 4.27, SD = .59.

Table 1. *Correlations between variables*

	1	2	3	4	5	6
1. Perceived age-related discrimination	(71)					
2. Life satisfaction	.05	(.92)				
3. Aging anxiety	.03	-.15**	(.84)			
4. Neuroticism	-.01	-.07	.05	(.87)		
5. Self-efficacy	.05	.05	-.06	-.29**	(.84)	
6. Optimism	.01	.02	-.03	-.48**	.61**	(.67)

Note: **. p < .01.

Hypotheses testing

Because there were no significant correlations among all three variables, the mediation analysis could not be tested because all necessary conditions for the mediation analysis were not met. Therefore, the hypothesis that aging anxiety mediates the relationship between perceived age-related discrimination and life satisfaction in middle-aged individuals was not supported. Further, moderation hypotheses within the study were tested: personality traits (neuroticism, self-efficacy, and optimism) moderate the mediating effect of aging anxiety on the relationship perceived age-related discrimination and life satisfaction. Model 58 of the PROCESS program for SPSS was used to test this hypothesis of moderated mediation, where the indirect paths are moderated simultaneously.

The first model tested included perceived age-related discrimination as the predictor, life satisfaction as the criterion, aging anxiety as the mediator, and neuroticism as the moderator in both the relationship between perceived age-related discrimination and aging anxiety, and the relationship between aging anxiety and life satisfaction. The prediction model for aging anxiety was not statistically significant (p = .23). Neither perceived age-related discrimination (p = .14) nor neuroticism (p = .16), nor the interaction between perceived age-related discrimination and neuroticism (p = .09) predicted aging anxiety. The prediction model for life satisfaction was statistically significant (p < .05). However, none of the variables in the model had a statistically significant prediction: perceived age-related discrimination (p = .33), aging anxiety (p = .57), neuroticism (p = .98), and the interaction between aging anxiety and neuroticism (p = .81). The hypothesis that neuroticism moderates the mediating effect of aging anxiety on the relationship between perceived age-related discrimination and life satisfaction was not supported.

The second model included perceived age-related discrimination as the predictor, life satisfaction as the criterion, aging anxiety as the mediator, and self-efficacy as the moderator in both the relationship between perceived age-related discrimination and aging anxiety, and the relationship between aging anxiety and life satisfaction. The prediction model for aging anxiety was not statistically significant (p = .14). Neither perceived age-related discrimination (p = .06) nor self-efficacy (p = .11), nor the interaction between perceived age-related discrimination and self-efficacy (p = .06) predicted aging anxiety. The prediction model for life satisfaction was statistically significant (p < .05). Although perceived age-related discrimination was not a significant predictor (p = .06), aging anxiety (b = -1.28, p < .01), self-efficacy (b = -1.52, p < .05), and the interaction between aging anxiety and self-efficacy (b = .42, p < .05) were statistically significant predictors. The lower the self-efficacy, the higher the negative relationship between aging anxiety and life satisfaction. The data partially support the hypothesis that self-efficacy moderates the mediating effect of aging anxiety on the relationship between perceived age-related discrimination and life satisfaction.

The third model included perceived age-related discrimination as a predictor, life satisfaction as the criterion, aging anxiety as the mediator, and optimism as the moderator both in the relationship between perceived age-related discrimination and aging anxiety, and in the relationship between aging anxiety and life satisfaction. The prediction model for aging anxiety was not statistically significant (p = .31). Neither perceived age-related discrimination (p = .07) nor optimism (p = .15), nor the interaction between perceived age-related discrimination and optimism (p = .09) predicted aging anxiety. The prediction model for life satisfaction was statistically significant (p < .01). Although perceived age-related discrimination was not a significant predictor (p = .24), aging anxiety (b = -1.37, p < .01), optimism (b = -1.75, p < .05), and the interaction between aging anxiety and optimism (b = .55, p < .05) were significant predictors. The lower the optimism, the higher the negative relationship between aging anxiety and life satisfaction. The data partially support the hypothesis that optimism moderates the mediating effect of aging anxiety on the relationship between perceived age-related discrimination and life satisfaction.

4. DISCUSSION

The purpose of the current research was to test whether personality traits moderate the indirect effect of ageist attitudes on life satisfaction through aging anxiety. This topic is important firstly due to the high prevalence of age-related discrimination (De La Fuente-Nunez et al., 2021), and secondly because of the negative consequences of negative attitudes towards aging, such as physical and mental health issues (Hu et al., 2021), decreased well-being (Robertson, 2017; Westerhof & Wurm, 2015), poor social functioning (Allan et al., 2014), or reduced employability (Ahmed et al., 2012). Similar negative consequences have been identified for aging anxiety, representing individuals' worries and fears about aging (Lynch, 2000): increased psychological distress, decreased sense of life meaning (Bodner et al., 2021), lower quality of life, low self-esteem (Yawar et al, 2022), higher levels of depression (Carrard et al., 2021), and negative evaluation of one's own mental health (Ramírez, & Palacios-Espinosa, 2016).

The current study aimed to investigate to what extent aging anxiety not only predicts lower levels of life satisfaction but also explains the relationship between perceived age-related discrimination and life satisfaction. Perceptions of age-related discrimination were not associated with either life satisfaction or aging anxiety. Instead, aging anxiety was negatively associated with life satisfaction. This result is consistent with previous studies where aging anxiety has had a range of negative consequences (Bodner et al., 2021; Carrard et al., 2021; Ramírez, & Palacios-Espinosa, 2016). The research hypothesis was partially supported.

The study provides an important theoretical contribution by considering the moderating role of personality traits. The hypothesis of the study was that personality traits (neuroticism, self-efficacy, and optimism) moderate the mediating effect of aging anxiety on the relationship between perceived age-related discrimination and life satisfaction. Although these personality traits could represent protective or vulnerability factors (Carver & Buchanan, 2016; Friedman, 2019; Neupert et al., 2008; Ready et al., 2012), previous studies have not considered them as potential moderators. The results of the current research did not support the moderator role of neuroticism. However, previous studies have highlighted that neuroticism is a vulnerability factor for psychological disorders, cardiovascular problems, and neurological disorders (DuPont et al., 2019; Marijnissen et al., 2004; Marušič, & Eysenck, 2001; Terracciano et al., 2021; Vinograd et al., 2020). It is possible that neuroticism primarily represents a pre-existing condition for physical and psychological problems in old age rather than a factor that accentuates the negative effect of other variables.

The data indicated that self-efficacy moderates the relationship between aging anxiety and life satisfaction. The lower the self-efficacy, the stronger the negative relationship between aging anxiety and life satisfaction. The conclusion of this study is in line with previous findings, where self-efficacy has been associated with increased resilience and reduced mental health issues (Jackson et al., 2014; Schönfeld et al., 2016). Similar results have been identified for elderly samples, where self-efficacy positively correlated with physical functionality, adaptation to aging, well-being, and quality of life (Bagheri et al., 2022; Holahan & Holahan, 1987; Tovel et al., 2019).

The data also indicated that optimism moderates the relationship between aging anxiety and life satisfaction. The lower the optimism, the stronger the negative relationship between aging anxiety and life satisfaction. This result is consistent with existing literature, which shows that optimism is positively associated with resilience, well-being, physical health, and mental health (Amonoo et al., 2021; Arslan & Yıldırım, 2021; Souri & Hasanirad, 2011). Optimism is beneficial in old age, promoting functional behaviors (Lennings, 2000) and positively correlating with well-being, mental health, and perceived sense of purpose in life (Ju et al., 2013; Weitzer et al., 2022).

The current study suggests that psychologists or psychotherapists can focus on aging anxiety in interventions aimed at enhancing well-being in older adults. Additionally, they could consider the role of individual differences as protective factors. Aging anxiety is reflected in lower life satisfaction, especially in individuals with low self-efficacy and low optimism. Therefore, alongside addressing aging anxiety, practitioners can focus on interventions specifically aimed at increasing self-efficacy or optimism, and they can help their clients cultivate personal resources that serve as protective factors against the negative effects of aging anxiety on life satisfaction.

Limitations and future directions

The study presents several limitations that could be addressed in future research. Firstly, the study was cross-sectional, therefore causal conclusions cannot be drawn. For instance, some studies have highlighted that aging anxiety may be an antecedent of age-related discrimination. In one study (Bashian & Caskie, 2022), aging anxiety predicted negative attitudes towards aging, which in turn led to distancing from older individuals and lower levels of compassion towards them. In another study (Donizzetti, 2019), aging anxiety predicted age-related stereotypes, and stereotypes led to more pronounced discrimination. Future studies could test the relationships between variables across multiple waves. Such studies could also investigate the existence of a vicious cycle between aging anxiety and negative attitudes towards aging, where the two reinforce and amplify each other. Secondly, the variables were measured using self-report questionnaires. These are vulnerable to subjectivity, biases, and common method bias.

Future studies could consider collecting data from multiple sources. Lastly, the sample consisted predominantly of female participants; therefore, it is not representative of the population in Romania. Future studies could conduct similar analyses based on a statistically representative sample..

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STUDIA DOCTORALIA
PSYCHOLOGY AND EDUCATIONAL SCIENCE
UNIVERSITY OF BUCHAREST
VIRTUTE ET SAPIENTIA

The role of social media use in the relationship between self-esteem and body image

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ARTICLE INFO

Article history:
Received 18-January-2024
Accepted 30-March-2024
Available online 01-May-2024

This article should be cited as: Strechioiu, B. L. M. (2024). The role of social media use in the relationship between self-esteem and body image. *Studia Doctoralia. Psychology and Educational Science, 15*(1), 23-34. https://doi.org/10.47040/sdpsych.v15i1.170

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ABSTRACT

The purpose of this study is to investigate the relationship between self-esteem and body image, but also the moderating role of social media use on the relationship between self-esteem and body image. A number of 166 people, aged between 18 and 80, M = 26.39, SD = 11.13, participated in this research, of which 19 were male, 145 were female, and two participants declared that they belonged to another gender. The materials used were: Rosenberg's Self-Esteem Scale (Rosenberg, 1965), The Body Appreciation Scale-2 (Tylka & Wood-Barcalow, 2015) and The Facebook Intensity Scale (Ellison et al., 2007). The results showed that self-esteem is a significant predictor of body image and social media use does not moderate the relationship between self-esteem and body image.

Keywords: *self-esteem, body image, social media*

1. INTRODUCTION

The use of social media has an indispensable role both in general situations of everyday life, as well as the influence it has on the relationship between self-esteem and body image. Additionally, understanding the role that social media use plays in the relationship between self-esteem and body image can provide relevant insights into how individuals navigate and adapt to the online environment and the social pressures related to the body image. Studying the role of social media use in the relationship between self-esteem and body image can bring a number of clinical benefits, such as identifying risk factors for eating disorders and developing personalized interventions to promote healthy body image and positive self-esteem.

There are several studies that have contributed to the knowledge that social media influences self-esteem, body image, body satisfaction and eating habits (Rodgers et al., 2020; Sanzari et al., 2023; Veldhuis et al., 2020), this is possible due to the way social networks can reveal many

problems due to social comparison (Saiphoo & Vahedi, 2019). A study by Steers et al. (2014) states that people can compare several aspects by using social media networks, including physical appearance, and the more time users spend on these social networks, the more comparisons with others occur, which can have a negative impact on self-esteem and body image (Blease, 2015).

The conclusions of the study conducted by Marengo et al. (2018) present many practical implications for the development of interventions aimed at preventing or reducing the negative impact of social media on body image and on the health of individuals. These interventions should aim to promote critical awareness of the idealized images that are presented on social media, as well as the potential impact that exposure to such images can have on their body image and, consequently, on their psychological well-being (Marengo et al., 2018).

Self-Esteem

Self-esteem represents a positive or negative attitude towards oneself, which can be considered a key indicator of a person's psychological well-being (Virk & Singh, 2020). According to the study by Frost and McKelvie (2004), self-esteem is defined as the overall level of global respect that people have for themselves. Recent studies show how self-esteem reflects individuals' self-confidence in their own abilities, reflecting self-assessment (Diener, 2000). The findings of the research conducted by Wilson and Ross (2001) demonstrate that people with high self-esteem tend to think they are smart, attractive, or popular, and although these people admit that they have had flaws or made mistakes in the past, they see the present moment in a positive light, thinking they changed for the better even when they didn't.

In the last few decades, the researchers debated the degree to which self-esteem should be conceptualized as a trait-like construct that remains relatively stable over time or as a state-like process that fluctuates continuously in response to environmental factors and situations (Donnellan et al., 2012). Although individuals may experience differences in the particular trajectory that their self-esteem follows, new longitudinal studies suggest that self-esteem tends to be elevated from adolescence to middle adulthood (Orth & Robins, 2014). In addition, there is a growing number of longitudinal studies that have followed the trajectory of self-esteem in critical periods of development, such as adolescence (Birkeland et al., 2012), young adulthood (Chung et al., 2014) and old age (Wagner et al., 2013), and in general, the results of these studies were consistent with the lifespan trajectory described above, that is, they show increases from adolescence to mid-age and then decrease until old age.

The study conducted by Jiang and Ngien (2020) shows that an important factor contributing to lower self-esteem is social comparison. Social comparison leads to the emergence of beliefs that external conditions approved in the social environment are more important than internal and personal traits, so as a person perceives their own characteristics as less important in achieving social recognition, the level of self-esteem will be low (White et al., 2006). The theory of social comparison was first proposed by Festinger (1954) as an attempt to understand how social activities influence an individual's self-evaluation. As a result, two directions of social comparison appeared, one being the upward social comparison, representing comparison with a higher target, and the other being the downward comparison, namely comparison with a lower target (O'Brien et al., 2009). Previous research highlights how the ascending social comparison can negatively influence self-assessment, causing dissatisfaction with life, frustration, depression and discouragement, jealousy, hostility and other negative emotions (Morse & Gergen, 1970). On the other hand, descending social comparison usually improves self-assessment and generates positive feelings (Collins, 1996).

Body image

Body image is usually defined as the psychological representation of an individual's body and refers to feelings, attitudes, and, as well as perceptions and behavior towards one's own body or certain parts of the body (Nagl et al., 2021). Body image is a multidimensional dynamic construct consisting of perceptual, cognitive, affective and behavioral elements (Wertheim et al., 2009). A specific meaning is given to the perception of one's own body, which is closely related to self-confidence, self-esteem, self-image and the identity of a person (Izgiç et al., 2004). Thus, research has shown that people with a positive and realistically defined body image are safer in their interpersonal relationships and are more successful (Palladino Green & Pritchard, 2003), and the attitudes and behaviors of these people are also healthier and realistic (Field et al., 2001).

Due to the multidimensional character of the body image, Grabe et al. (2008) propose an examination of the effects related to the way people look at the body image. One such effect is body satisfaction/dissatisfaction, which is the overall and subjective assessment of a person's body (Grabe et al., 2008). In addition, based on an analysis of published measurements of body image satisfaction and related constructs, van den Berg et al. (2002) define two additional dimensions of body image, namely cognitive dimension and behavioral dimension. The authors argued that the first component, the cognitive dimension of the body image, tries to capture the beliefs, thoughts and attributions of the body image by measuring constructs such as self-atentional focus and internalization of social stereotypes about appearance (van den Berg et al., 2002), and the behavioral component is defined as that which evaluates the

behavior of people related to the body image (van den Berg et al., 2002).

Social comparison, along with the interiorization of ideals, is among the main mechanisms that participate in the distorted perception of body image among people (Jiotsa et al., 2021). Perceiving the body image in a negative manner is dictated by negative perceptions of the physical appearance of a person, which negatively affect or interfere with mental health and well-being (Clay et al., 2005). To see the body image in a positive manner represents the positive perceptions of the person on the physical appearance (Virk & Singh, 2020). The more a person feels dissatisfied with their body, the greater the risk of going through a depressive episode becomes, having low self-esteem (Paxton et al., 2006) and poorer quality of life (Wynne et al., 2016). Recognition of these negative consequences underlines the importance of supporting a positive body image, especially among young adults, in order to optimize their overall health and well-being (Rawana & Morgan, 2014).

The study by Marengo et al. (2018) presents the possibility that due to socio-cultural influences and socialization processes, body image becomes a central feature in the self-concept of adolescents. Thus, body image becomes one of the most important psychological factors affecting adolescent personality and behavior (Tiwari, 2014). Over the past 30 years, the media has overexposed people to beauty ideals, starting at an early age (Blowers et al., 2003), turning these ideals into new benchmarks (Grabe et al., 2008). Additionally, etiological models incorporating environmental factors consider social pressure on physical appearance to be a determining factor in the development of eating disorders, as a result of a distorted body image (Gorwood et al., 2016).

Self-esteem and body image

Of all the personal attributes that influence body image development, Cash (2002) suggested that self-esteem is the most important. In recent decades, studies have shown that negative body image and body discontent lead to low self-esteem (Rodgers et al., 2020). This relationship between self-esteem and body image is supported by several studies (Paxton & Phythian, 1999; Webster & Tiggemann, 2003), being also demonstrated, that certain aspects of the body image correlate positively with self-esteem, for example perceived physical attractiveness (Davison & McCabe, 2005). According to the study by Branden (1969), self-esteem is the sum of self-confidence and self-respect, and when a person does not adopt a positive attitude towards their body, this can lead to feelings of worthlessness.

Social comparison theory (Festinger, 1954) has been increasingly used to understand the process by which self-esteem can influence a person's body image through comparisons (Ameen et al., 2022). Thus, self-esteem and body image have been identified in previous research on the behavior of individuals as representing important components of this theory (Tylka & Sabik, 2010). According to Stice et al. (2011), because women are very frequently judged by their appearance, they often compare their physical appearance to that of other people. Additionally, previous research has found that even women with high self-esteem may engage in social comparison processes (Gentina et al., 2018).

Cooper and Fairburn (1993) investigated body dissatisfaction, importance of physical appearance, self-esteem and mood in a sample of individuals in the UK who were being treated for bulimia. They found that change in body image dissatisfaction over 10 to 12 weeks of treatment was strongly associated with change in mood, while change in the importance of physical appearance was associated with changes in self-esteem (Cooper & Fairburn, 1993). In the same sense, in the research conducted by Masheb and Grilo (2006), the results showed that the importance of body image was associated with changes in self-esteem, while body dissatisfaction was associated with changes in both self-esteem and and of disposition.

Considering the above, we propose to analyze the relationship between self-esteem and body image, thus formulating the following hypothesis:

H1. *Self-esteem is a significant positive predictor of body image*.

Use of social media

Social media networks refer to online platforms such as Facebook, Instagram and Twitter that allow users to create and share visual and textual content with other users (Saiphoo & Vahedi, 2019). Social media is fast becoming a critical aspect of everyday life for many people, as highlighted by the findings of the study by Orben (2020), in January 2019 there were 3.5 billion active social media users worldwide, and this number continues to grow every year. Due to the ever-increasing popularity of the use of social networks among people of all ages, but especially among young people, many studies have investigated their role as a factor in their psychological adaptation (Marengo et al., 2018).

On social media, people often self-disclose selectively and build their profile based on preferred characteristics, for example, emotions, personality traits or opinions (Vogel et al., 2014). Social media generates comparison-based information and accessible feedback, such as the number of followers, likes, comments, and retweets (Jiang & Ngien, 2020), and such information allows people to quickly form impressions of others (Appel et al., 2016). Important to note is that the most frequently used sites offer a highly visual environment, for example Instagram, and the main activity is image sharing (Ridgway & Clayton, 2016). Thus, there are frequent opportunities to make comparisons related to physical appearance and, unlike traditional media, these are

often made in comparison to socially relevant and other known individuals, who tend to present themselves, life and their physical appearance in an exclusively positive light (de Vries & Kühne, 2015).

The research conducted by Lawler and Nixon (2011) highlights the existence of the factor of internalizing the ideals exposed within social media networks, which involves supporting the ideals of appearance promoted by the mass media, as well as adopting these ideals, reflecting the tendency of people to compare appearance with models idealized media. Moreover, social media users may use media content as a source of information on how to improve their physical appearance and may compare themselves to other users promoting an idealized self-image to set a standard to live up to (Rousseau & Eggermont, 2018). As a result, social media users come to consider the proposed ideal standard as the social definition of attractiveness and feel dissatisfied with themselves (de Vries et al., 2016).

The role of social media use on the relationship between self-esteem and body image

As exposure to idealized images on social media increases, there is a growing body of research on the role of social media use on self-esteem and body image (McLean et al., 2015; Tiggemann & Anderberg 2020). The large number of images posted on some social media platforms, such as Instagram, where 10 million new photos are uploaded every hour (Jiang & Ngien, 2020), provides users with opportunities to make social comparisons related to appearance. Such social networks are preferred by users because they allow users with low self-esteem to create an image of themselves according to how they want to be perceived by others (Tazghini & Siedlecki, 2013).

Rodgers et al. (2014), state that body image and disordered eating behaviors are strongly correlated with time spent on social media. According to Button et al. (1997), eating disorders are due to either negative body image or low self-esteem, in which cases pathological patterns of eating behavior serve as a coping mechanism for users' exposure to the content they choose to watch on social media networks. To address the growing prevalence of eating disorders, it is necessary to understand the risk factors associated with the development of these behaviors, factors that can be represented by body dissatisfaction, or the negative subjective evaluation of one's own weight or body shape (Stice, 2002).

Although there is some evidence that body comparisons are automatic and unconscious (Gilbert et al., 1995), the experimental study conducted by Want and Saiphoo (2017), presented evidence that making comparisons with social media images is not a automatic process, but requires cognitive effort and is therefore under the full control of the person making the comparison, at least to some extent. Studies have shown that social media exposure impacts body image both positively and negatively (Ahmad et al., 2019). This depends on the type of online interaction; social media likes increase positive body image perception, but seeing other people's selfies, which we may find more attractive, can lead to negative body image perception (Chua & Chang, 2016).

Several correlational studies have examined the relationship between social media use and body image (Fardouly & Vartanian, 2016), and the study by Meier and Gray (2014) of preadolescent girls and high school students concludes that social media use, such as Facebook, leads to comparisons of physical appearance. There are relatively few longitudinal studies of social media use, but results from the study by Frison and Eggermont (2017) demonstrated that using Instagram leads to a decrease in self-esteem over time, and the results of the research conducted by Hawes et al. (2020), showed that feelings of social comparison on social media are closely related to social anxiety, low self-esteem, and a distorted body image. All these studies directly or indirectly suggest that exposure to photos of other users on social networks can lead to deterioration of mental health, resulting in low self-esteem and negative body image (Bodroža et al., 2022).

Considering the above, we propose to analyze the moderating role of the use of social media networks on the relationship between self-esteem and body image, so we formulate the following hypothesis:

H2. *Social media use moderates the relationship between self-esteem and body image*.

2. METHODOLOGY

Participants and procedure

A number of 166 people between the ages of 18 and 80 participated in the present study, M = 26.39, SD = 11.13, of which 19 were male (11%), 145 were female (87%), and two participants declared that they belong to another gender (1%). Regarding the area of origin, 124 people belong to the urban area (75%) and 42 people belong to the rural area (42%). In regard to the marital status, 72 people are single (43%), 28 people are married (17%), 63 people are in a relationship (38%), one person is divorced (1%), and two people are widows (1%). In terms of the level of education, 105 people graduated from high school (63%), 36 people graduated from bachelor's studies (22%), 17 people graduated from master's studies (10%), and eight people have graduated from post-secondary education (5%), and in terms of professional status, 109 people are students (66%), 47 people are employed (28%), and 10 people are unemployed (6%).

Inclusion criteria: participants must be Romanian citizens over 18 years of age. The sampling method is one of convenience. Out of a total of 200 people invited to participate in the study, only 166 people agreed to participate until the end by completing the questionnaire (83%). Study participants were contacted through multiple sources, knowledge, internet. They participated voluntarily and were not rewarded for participating in the study.

The research ethics conditions regarding data processing and interpretation, as well as data security monitoring, were met. The data were initially organized in encrypted Excel spreadsheets to which only the author of this study had access. No participants' names or other data that could link the participant's identity to the data provided by them were requested.

Instruments

Sociodemographic variables were collected through a list of questions regarding age, gender, background, marital status, and professional status.

Self-esteem was measured with Rosenberg's Self-Esteem Scale (Rosenberg, 1965). The instrument comprises 10 items and does not measure multiple dimensions. Answers are given on a four-point Likert scale, where 0 – strongly disagree and 3 – strongly agree. Scores are obtained by summing the scores of each item. Examples of items: "I feel that I have a number of good qualities", "I take a positive attitude towards myself".

Body image was measured with The Body Appreciation Scale-2 (Tylka & Wood-Barcalow, 2015). The instrument comprises 10 items and does not measure multiple dimensions. Answers are given on a five-point Likert scale, where 1 – never and 5 – always. Scores are obtained by summing the scores of each item. Examples of items: "I respect my body", "I take a positive attitude towards my body".

Social media use was measured with the Facebook Intensity Scale (Ellison et al., 2007). The instrument comprises eight items. Answers are given on a five-point Likert scale, where 1 – strongly disagree and 5 – strongly agree. Scores are obtained by summing the scores of each item. Examples of items: "Facebook has become part of my daily routine", "I would be sorry if Facebook shut down".

3. RESULTS

The present study has a cross-sectional, descriptive and correlational design. For data organization and hypothesis testing, the Jamovi statistical analysis program was used, including the medmod module (The jamovi project, 2024).

Descriptive statistics

Mean scores, standard deviations, internal consistency coefficients, and correlations between variables are presented in Table 1.

Table 1. *Descriptive statistics*

	M	SD	α	IN	SS	AC
IN	30.42	7.80	.81	1		
SS	18.55	6.61	.89	-.09	1	
AC	36.13	9.58	.96	-.04	.79**	1

Note: **. *p* < *.01*, *. *p* < *.05*
IN = Social Media Use, SS = Self-Esteem, AC = Body Image

The scores for the use of social media networks are very high, M = 30.42, SD = 7.80, for self-esteem the scores are relatively high, M = 18.55, SD = 6.61, and in the case of body image the scores are relative high, M = 36.13, SD = 9.58. At the same time, it is observed that there are significant positive correlations between self-esteem and body image, r = .79, p < .01.

Skewness and kurtosis are in the range (-1, 1), which reflects a normal data distribution. There were no missing cases and no cases were removed from any of the statistical analyses.

Hypothese testing

H1. *Self-esteem is a significant positive predictor of body image*.

In order to test this hypothesis, a simple linear regression analysis was performed, with self-esteem as the predictor and body image as the dependent variable.

Table 2. *Simple linear regression analysis for self-esteem as a predictor of body image*

						95% CI	
Predictor	**Estimate**	**SE**	**t**	**p**	**β**	**Lower**	**Upper**
SS	1.14	.07	16.35	< .001	.79	.69	.88

Note: R^2 = .62
SS = Self-Esteem

Self-esteem is responsible for 62% of the variation in body image, the regression equation being statistically significant, F(1, 164) = 267.37, p < .01. Self-esteem is significantly positively associated with body image, β = .79, CI95%(.69, .88), p < .01.

Considering this result, we can say that hypothesis H1 is supported by the analyzed data.

H2. *Social media use moderates the relationship between self-esteem and body image*.

In order to test this hypothesis, a moderation analysis was performed with self-esteem as the predictor, social media use as the moderating variable and body image as the dependent variable.

Table 3. *Moderation estimation for social media use in the relationship between self-esteem and body image*

			95% CI			
	Estimate	**SE**	**Lower**	**Upper**	**Z**	**p**
SS	1.14	.07	1.00	1.28	16.38	< .001
IN	.04	.06	-.07	.16	.69	.49
SS ✻ IN	-.01	.01	-.03	.01	-.74	.46

Note: SS = Self-Esteem, IN = Social Media Use

Social media use fails to moderate the relationship between self-esteem and body image, b = -.01, CI95%(-.03, .01), Z = -.74, p = .46.

Considering this result, we can say that hypothesis H2 is not supported by the analyzed data.

4. DISCUSSION

Participants in this study scored very high on social media use. Self-esteem scores are relatively high, and body image scores are also relatively high. These results show that the study participants are frequent users of social media and generally have a positive self-confidence and perception of themselves and their body image. This can be influenced by a number of factors, including how users compare themselves to others on social media or how they perceive and react to images and messages related to physical appearance that they encounter in their online interactions (Meier & Gray, 2014).

Significant correlations were observed between certain variables in this study. Thus, self-esteem shows significant positive correlations with body image. As a result of analyzing this correlation, we can conclude by the fact that when self-esteem is generally high, there is likely to be a positive perception on the body image. This finding suggests that the level of confidence and self-esteem can contribute to the development of a more balanced attitude towards your own body, even when social media users could be exposed to unrealistic social pressures and beauty standards (Frison & Eggermont, 2017). Consequently, in the case of this study it is noted that the use of social media networks fails to moderate the relationship between self-esteem and body image. In other words, the results suggest that the way people perceive themselves and the perception of their own body image are more closely related to the trust and respect they give to themselves, rather than to the frequency of using social networks.

The first hypothesis of the study refers to the relationship between self-esteem and body image. After conducting the analysis, we found that self-esteem had a positive impact on the body image. According to the study conducted by McCarroll et al. (2009), self-esteem is a key factor in explaining individual variations in emotional states during social interactions, including in terms of perception of body image, so a high level of self-esteem can help

overcome negative feelings that may arise from social comparisons, contributing to a more positive perception of your own body image. Also, a research conducted by Zeigler-Hill (2013) shows how people with high self-esteem tend to perceive themselves in a more positive way, which can also influence their perception of their own body image. In addition, according to Mulgrew et al. (2019), higher levels of self-esteem in relation to body image indicate that individuals who have high confidence in their own values and personal qualities also have, a more positive and acceptable perception of their own body image.

The second hypothesis of the study addressed the moderating role of the use of social media networks in the relationship between self-esteem and body image. Regarding the moderating role of social media use on the relationship between self-esteem and body image, we observed that social media use fails to moderate the relationship between self-esteem and body image. Although these social networks can represent platforms for social comparison and exposure to unrealistic standards of beauty, their impact on self-esteem and body image can vary depending on several factors, such as ways of use, content consumed and social interactions from the online environment (Ahmad et al., 2019). Individuals may be exposed to various messages and perspectives regarding beauty standards, and how they react to them may depend on their level of awareness, emotional regulation skills, and self-perception (Peluchette & Karl, 2008). It is possible that some users are less susceptible to the negative impact of beauty standards promoted on social networks or use these platforms in a way that increases their self-confidence and improves their perception of body image (Madge et al., 2009).

According to the study conducted by Meier and Gray (2014), which examined the effects of social media usage on young women, demonstrated that there is no significant link between time spent on social networks and negative effects on users, such as negative body image. Also, in a study conducted by Fardouly et al. (2015), the findings suggested that the use of social media networks does not have a direct effect on users, but certain characteristics of individual differences, such as the high tendency to compare appearance physically, can make them more vulnerable to the influence of social media. Furthermore, according to the results of the study conducted by Sherlock and Wagstaff (2019), no experimental effect of exposure to images posted on Instagram on users' self-esteem was found, requiring a wider range of factors to be considered, such as social interactions and how users perceive and interpret content on social media platforms.

Consequently, the results obtained in the present study are in agreement with the literature, underlining that self-esteem is an essential factor in determining how individuals perceive their own body image, and that the use of social media networks does not seem to influence substantially the relationship between self-esteem and body image, this aspect reflecting the complexity and diversity of individual experiences in the online environment and the need to investigate more deeply how digital social interactions affect the self-perception of users of various social networks and, implicitly, the way they perceive their own physical appearance.

Practical implications

The present study, regarding the role of social media use on the relationship between self-esteem and body image, may have multiple practical implications. The results of the study could guide the development of educational and intervention programs aimed at promoting healthy use of social networks and improving self-esteem and body image among users of these networks platforms. These programs could include educational components about the impact of online social media on mental health and self-esteem, providing information about the risks associated with excessive or uncontrolled use of social networks.

Intervention programmes could also provide practical strategies and techniques for promoting a positive body image. These strategies may involve promoting self-knowledge and self-acceptance, encouraging a critical and balanced attitude towards online content, and developing stress management skills and social pressures. Moreover, this information could be integrated into guidelines and recommendations for parents, educators, mental health professionals and others involved in the lives of young people, to help them navigate healthy and positive social media online.

Limitations and future directions

This study presents results that have expanded beyond the usual field of observing the relationship between self-esteem and body image, bringing a new perspective on the relatively recent phenomenon of social media usage behavior and their impact on the previously described relationship. Therefore, the present study also had some limitations that should be considered when evaluating its implications and that may provide directions for future research.

First, all constructs assessed in this study were based on self-report measures, which could introduce possible biases due to the influence of social desirability effects and possible lack of awareness. At the same time, in self-report methods, subjects can be influenced by how they relate to the environment and the group they belong to, reporting what they would like to do, would be appreciated if they did, and not what they actually do (Lira et al., 2022). Therefore, in future research it would be preferable to resort to more objective measures in terms of evaluation, by using alternative data collection models, such as directly

accessing the social network profiles of the research participants, this providing a more reliable estimate of the frequency of their online activity. Another limit of the present study refers to the small number of participants. Additionally, in future research, we propose to address this limitation by including a larger number of participants, coming from diverse backgrounds and with varied characteristics, to ensure greater representativeness and to allow the generalization of the results obtained.

Moreover, it should be noted that our study shows a disproportion in terms of gender distribution of participants, with a higher proportion of female respondents compared to the number of males. This could influence the representativeness of the study's findings in terms of gender relations and limit our ability to draw definitive conclusions and generalise results for the entire population. In future studies, it is advisable to pursue a balanced approach in recruiting participants so as to ensure appropriate gender representation. Another limitation of the conducted study is represented by the cross-sectional design, this restricting our ability to establish causal relationships between the variables we investigated. Although most studies measuring a moderating effect have adopted this type of research design, longitudinal studies would allow for a better understanding of the associations between social media use, variable self-esteem, and body image concerns.

Despite these limitations, the present study provides a valuable contribution to the complex understanding of the relationship between social media use, self-esteem, and body image. The obtained results represent an important starting point for future research, which could explore these interactions more deeply and address the identified limitations to obtain a more comprehensive and precise understanding of the phenomenon. In addition, our research can serve as a foundation for the development of strategies and interventions aimed at promoting healthy social media use and supporting the development of positive self-esteem and healthy body image among users.

In conclusion, by investigating this relationship, we wanted to understand how interactions on social media platforms can influence users' perception of themselves and their bodies. The first research hypothesis was confirmed, so self-esteem is a significant predictor of body image. However, data analysis did not support the second hypothesis, which suggested that social media use might moderate the relationship between self-esteem and body image. Thus, this finding makes a significant contribution to the literature as it addresses existing gaps in understanding the impact that the use of social media platforms can have on users, particularly in terms of mental health and body image.

Given the increased prevalence of social media use, especially platforms that emphasize visual content, the importance of researching the effects of these platforms on mental health is becoming increasingly apparent. The present study highlights the need for continued and deeper investigation in this area to fully understand the consequences of social media use on users and to develop appropriate intervention strategies.

Because of the limitations of the current study, it is suggested that the topic be further investigated in a more robust manner in future research. It is essential to address these limitations in order to gain a more accurate and complete understanding of the relationship between social media use, self-esteem and body image. In this study, we have presented a number of perspectives and suggestions that can serve as a basis for future research on the effect that the use of social media has on self-esteem and body image. Therefore, in future studies it is necessary to identify situations and contexts in which the effects of social media use on self-esteem and body image may be more pronounced. These steps will contribute to a better understanding of the complex relationship between the use of social media networks and body perception, thus facilitating the development of effective strategies for increasing self-esteem and, implicitly, self-esteem, promoting a healthy body image.

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STUDIA DOCTORALIA
PSYCHOLOGY AND EDUCATIONAL SCIENCE
UNIVERSITY OF BUCHAREST
VIRTUTE ET SAPIENTIA

The role of emotional self-regulation in the relationship between eating disorders and well-being

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ARTICLE INFO

Article history
Received 8-March-2024
Accepted 14-April-2024
Available online 01-May-2024

This article should be cited as: Negoiță, M. A. (2024). The role of emotional self-regulation in the relationship between eating disorders and well-being. *Studia Doctoralia. Psychology and Educational Science, 15(1),* 35-45. https://doi.org/10.47040/sdpsych.v15i1.171

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ABSTRACT

The aim of this study is to analyze the relationship between eating disorders and well-being. Furthermore, we seek to explore whether the relationship between these variables may be modetaed by a variable such as emotional self-regulation. The study was attended by 143 people aged between 18 and 74, M = 27.85, SD = 13.42, of which 18 men (13%) and 125 women (87%). The instruments used were the Emotion Regulation Questionnaire (Gross & John, 2003), the Eating Disorder Inventory – 3 (EDI-3) (Garner et al., 2010), and the Satisfaction with Life Scale (SWLS) (Diener et al., 1985). The results showed that eating disorders are significantly negatively associated with well-being. Additionally, emotional self-regulation manages to moderate the relationship between body dissatisfaction and well-being through its expressive suppression dimension. The practical implications of the study were discussed, in terms of development of psychoeducational programs to raise awareness of the risk of developing eating disorders and their direct implications for well-being, so that individuals seek to learn the most effective ways of emotional regulation strategies for themselves, and use them appropriately.

Keywords: *eating disorders, well-being, emotional self-regulation*

1. INTRODUCTION

Research in recent years has established that there is a strong and clear association between eating disorders and well-being (De Vos et al., 2018; Jenkins et al., 2011). Moreover, the link between increased predisposition to develop eating disorders and decreased ability to self-manage emotions has been demonstrated (Prefit et al., 2019; Ruscitti et al., 2016). However, other studies confirm that the adoption of emotional self-regulation strategies, appropriate to various situations in everyday life, can be considered a precondition for good functioning and for ensuring an optimal level of well-being and overall health (Nykliček et al., 2010).

Considering these findings, in this paper we propose to study how certain emotional self-regulation mechanisms influence eating disorders, and therefore whether the use of these emotion regulation strategies can improve or even decrease the well-being of individuals who may be at risk of developing an eating disorder. The assumption that led to the choice of the topic of this paper refers to the idea that the way a person chooses to manage their emotions, both pleasant and especially less pleasant ones, can influence both the possibility of developing an eating disorder and their well-being.

Eating disorders

Eating disorders are serious mental disorders with potentially disabling effects on the individual, which carry an increased risk of mortality and can be extremely costly to treat. They considerably affect physical health and produce a major imbalance in the psychosocial functioning of the individual (Van Hoeken & Hoek, 2020). Eating disorders (ED) include specific disorders, such as bulimia nervosa, anorexia nervosa, binge eating disorder, and other less specific disorders involving distorted body image and eating behaviors that are motivated by weight loss (Merikangas & Merikangas, 2016). Eating disorders not otherwise specified (EDNOS) are considered to be the most common eating disorder, with a diagnosis rate of approximately 34% of females (Doll et al., 2005). The age at which a diagnosis of an eating disorder is most commonly reported is somewhere between adolescence and emerging adulthood (Favaro et al., 2018). For men, eating disorders have been noted to be much less common, but this does not necessarily mean that they are less likely to develop them. Anorexia and bulimia cases in men are generally reported for every ten such cases in women (Doll et al., 2005).

Studies that have focused on describing risk factors for the development of eating disorders have identified that these include: having a history of depression or anxiety, body dissatisfaction, excessive weight concerns, internalizing the ideal of being as thin as possible, going on strict diets, the impact of social media content consumption, and prevalent negative affect (Góngora, 2014).

Body dissatisfaction

According to Tylka (2004), body dissatisfaction has become extremely prevalent among women and is considered a normalized symptom in the population rather than a unique characteristic of people with clinical eating disorders. As it happens, Silberstein et al. (1988) pointed out that the sources that generate body dissatisfaction are differentiated for women and men. This may be because today's society idealizes women and men differently. Specifically, women are valued to an exaggerated extent for their body compared to men, who are valued more for their facial construction (Silberstein et al., 1988).

Drive for thinness

The drive for thinness is a condition that affects a considerable proportion of people worldwide, especially in developed countries, being closely related to ever-increased levels of body distortion, disordered eating behaviors and diagnosable eating disorders (Hewig et al., 2008). Eating disorders such as anorexia nervosa and bulimia nervosa include in their diagnostic criteria an exaggerated preoccupation with body shape and fear of gaining weight (American Psychiatric Association, 2013). For both men and women, ideal body models presented through the media were a primary predictor of drive for thinness (Fernandez & Pritchard, 2012).

Bulimia

The tendency to maintain a consistent and significant overeating pattern describes the symptomatology that can be conceptualized by the term bulimia nervosa (Russell, 1979). The root cause of bulimia s unknown. However, there is evidence that genetic factors play an important role in its perpetuation and onset (Bulik et al., 2003). The most common behavior among people with bulimia is purging. This state is characterized by forced vomiting (some patients induce this state of vomiting by placing a finger on their throat), but they may also use laxatives or diuretics to induce this state of release of the digestive tract after episodes of compulsive eating (Mehler, 2003).

Well-being

In order to have a better understanding of the concept of well-being, we consider it is important to mention what it means to be completely healthy. Health, as defined by the World Health Organization (WHO) (1948), is considered to be conditioned by be conditioned by the presence of a genera state of physical, mental and social well-being, and not require the mere absence of disease. That being said, the quality of life of individuals ultimately depends on their physical health, but also on their subjective well-being (Camfield & Skevington, 2008). For this reason, we understand how important it is to study the subjective well-being of humans in the context of optimal mental functioning (Magallares et al., 2014).

Previous research in the area of psychological well-being has proposed several different theoretical models to characterize this construct. These models include hedonic well-being (Referring to the extent to which a person feels happiness), evaluative well-being (e.g., a person's satisfaction with his or her life), eudaimonic well-being (having a well-defined purpose in life, which includes having control over one's life and autonomy in making decisions), and other constructs, such as optimism (Trudel-Fitzgerald et al., 2019).

Subjective well-being is that affective component (positive and negative emotional responses) by which a person evaluates his or her own life, and generally involves a global evaluation of all aspects of an individual's life

(Diener, 1984). In contrast, satisfaction with life is considered in other research to be the component that strictly pertains to the cognitive evaluation of subjective well-being (Góngora, 2014).

Eating disorders and well-being

Eating disorders have detrimental implications for the physical health and well-being of individuals (Mond et al., 2012). The literature has indicated that eating disorders are often associated with other disorders of normal mental functioning, the most commonly reported being depression and anxiety (Fairburn & Brownell, 2002). These psychological disorders are predominantly accompanied by negative emotions, which can have a significant negative impact on life and thus on well-being. For example, intense negative emotional states have been reported in individuals who engage in strict dieting or caloric restriction to control body weight (Fairburn & Brownell, 2002). These associations between depressive symptoms and eating disorders have significant implications for well-being (Kenny et al., 2023).

In the study by Magallares et al. (2014), it was found that female participants in the study who already had an eating disorder in their history reported lower levels of subjective well-being that women who had never had an eating disorder, nor did they show evidence of having dissatisfaction with their bodies. Other studies have also found a link between various eating attitudes adopted (including dieting and bulimia) and impaired well-being (Magallares, 2012).

The relation between the predisposition to eating disorders and the use of social media could also be worth considering. Much of the content on social media promotes idealized body images that can attract attention. Specifically, frequent viewing of such content can contribute to body image problems (such as body dissatisfaction or drive for thinness), specific eating disorders or even psychological distress (Marks et al., 2020).

Taking into account the above, we propose to analyze the relationship between eating disorders and well-being, so we formulate the following hypothesis:

H1. *Eating disorders are significantly and negatively associated with well-being*.

Emotional self-regulation

Modalities of emotional self-regulation can be divided into adaptative emotional regulation strategies (active problem solving, emotional awareness and acceptance of emotions, cognitive reappraisal) and maladaptive emotional regulation strategies (rumination, emotional avoidance and emotional suppression) (Leppanen et al., 2022).

From an evolutionary perspective, emotions are considered to have emerged in the evolutionary process of the human species due to their ability to coordinate multiple response systems (for example, cognitive, experiential or subjective, physiological and behavioral). There are several theoretical models in the literature that explain the mechanisms behind the emotional regulation process. Of these, the most influential is the emotion processing model (Gross, 1998).

Gross and John (2003) observed that there is a differentiation among individuals when they adopt different emotional regulation strategies. Believing that differential use of the two most common emotion regulation strategies may have particular implications for emotional, social and well-being adjustment, they designed a self-report questionnaire on the two emotional self-regulation strategies: expressive suppression and cognitive reappraisal (Gross & John, 2003).

Expressive suppression

Expressive suppression is one of the most studied modalities of response shaping, which involves a continuous effort to inhibit the initially experienced emotional expression (Gross, 2015). This is generally considered a maladaptive form of emotional regulation, with implications for affective, social, and well-being dimensions (Gross & John, 2003). Moreover, expressive suppression can also have implications for cognitive and memory if overused (Richards & Gross, 1999). Expressive suppression can lead to decreased positive emotional experience, but not negative ones (Gross, 2015). However, expressive suppression can be beneficial in certain life circumstances, especially social ones where we are required to behave in a certain way (Richards & Gross, 1999).

Cognitive reappraisal

Cognitive reappraisal is considered an adaptative form of managing emotional states and has a number of benefits for affective functioning, relating to others, and well-being (Gross & John, 2003). In the study conducted by Brans et al. (2013), cognitive reappraisal was correlated with high levels of positive affect. Also, Gross & John (2003) defined cognitive reappraisal as an adjustment strategy centered on the antecedents of personal events, involving an interpretation of a situation according to the accompanying emotion, and modifying the emotional impact before it has fully occurred. Moreover, cognitive reappraisal is largely associated with an increased concern to change negative aspects of cognitions about particular situations, in order to thereby produce emotional regulation (Brockman et al., 2016).

Emotional self-regulation, eating disorders and well-being

Research on the moderating role of emotional self-regulation in the relationship between eating disorders and well-being is limited (Brannan & Petrie, 2011). In contrast, some studies have found that eating disorder symptoms may be mediated by a number of individual factors related

to self-perception and even emotional self-regulation (Brochu et al., 2018). Moreover, studies have shown a strong link between low emotional self-regulatory capacity and various dysfunctional regulatory behaviors, such as excessive drinking or eating when experiencing emotional difficulties. It is thought that individuals at risk of developing eating disorders may adopt such behaviors as self-regulatory strategies (Aldao et al., 2010).

In terms of emotional self-regulation strategies, people with different choose different ways to manage their emotions. With that being said, in the study conducted by Meule et al. (2019), it was noted that people with a diagnosis of restrictive anorexia and those with a diagnosis of bulimia nervosa more frequently used dysfunctional regulation strategies (such as considered expressive suppression) and less frequently those considered functional (such as cognitive reappraisal). This is also cited in the study by Dingemans et al. (2017), with expressive suppression noted as one of the most commonly used modalities of emotional self-regulation among people with eating disorders.

Taking into account the above, we propose to analyze the moderating role of emotional self-regulation in the relationship between eating disorders and well-being, so we formulate the following hypothesis:

H2. *Emotional self-regulation moderates the relationship between eating disorders and well-being*.

2. METHODOLOGY

Participants and procedure

A number of 143 people aged 18 to 74 participated in the present study, M = 27.85, SD = 13.42, of which 18 men (13%) and 125 women (87%). Regarding the place of origin, 38 were from rural areas (27%) and 105 were from urban areas (73%), and regarding weight, this ranged from 41 to 148, M = 66.31, SD = 15.55. In terms of height, it ranges from 152 to 190, M = 167.10, SD = 7.78. The inclusion criteria were that participants must be Romanian citizens, aged 18 years or older. The sampling method is one of convenience.

Out of a total of 200 people invited to participate in the study, only 143 agreed to participate to the end by completing the questionnaire (72%). Participants were recruited through online platforms. The data collection was carried out through the questionnaire made in Google Forms. Prior information about the purpose of data collection and the objective of this study was given through the questionnaire, and those details were announced on the questionnaire's introductory section. Respecting confidentiality was also introduced in this section. Completion of the questionnaire was strictly voluntary and anonymous. Participants in this study were not compensated and they also agreed to participate in this study by receiving informed consent beforehand. After giving consent, the survey questionnaires were completed. The research ethics conditions were met with respect to data processing and interpretation, as well as monitoring of data safety conditions.

Instruments

Sociodemographic variables were collected through a list of questions regarding gender, age, weight, height, background, level of education and professional status.

Emotional self-regulation was measured with the Emotion Regulation Questionnaire (Gross & John, 2003). The instrument comprises a total of 10 items and measures several dimensions, namely cognitive reappraisal, which contains six items, and expressive suppression, composed of four items. Responses are provided on a seven-step Likert scale, where 1- total disagreement and 7 – total agreement. This scale is a summative scale, meaning that scores are obtained by summing the scores of each item for each of the two factors. The internal consistency for cognitive reappraisal is α = .78, and for expressive suppression is α = .81.

Eating disorders were measured with the Eating Disorders Inventory – 3 (EDI-3) (Garner et al., 2010). The instrument comprises a total of 91 items, of which in the present study, we extracted 25 items, which together constitute the composite scale for "Eating Disorder Risk" (SCRCTA) and measures several dimensions, namely drive for thinness (DS) (seven items), bulimia (B) (eighy items), and body dissatisfaction (NC) (10 items). Responses are given on a six-step Liker scale where 1 – never and 6 – always. Scores are obtained by summing the scores of each item. The internal consistency of the scale for bulimia is α = .88, of the scale for body dissatisfaction is α = .86, and of the scale for drive for thinness is α = .84.

Well-being was measured with The Satisfaction with Life Scale (SWLS) (Diener et al., 1985). The instrument comprises five items and measures overall satisfaction with life as part of subjective well-being. Responses are provided on a seven-step Likert scale, where 1 – strongly disagree and 5 – strongly agree. Scores are obtained by summing the scores for each item. The internal consistency of the scale is α = .86.

Study design

The present study has a cross-sectional, descriptive, correlational design. Data organization and statistical analyzes were performed using the statistical analysis program IBM.SPSS.24 (IBM Corp, 2016) and Jamovi medmod module (The jamovi project, 2022) .

3. RESULTS

Descriptive statistics

Table 1. *Descriptive statistics*

	M	AS	α	ARRC	ARSE	DS	BU	NC	WB
ARRC	30.17	6.19	.78	1					
ARSE	13.80	5.53	.81	.18*	1				
DS	24.44	8.78	.84	.09	.15	1			
BU	16.72	8.02	.88	-.07	.20*	.54**	1		
NC	30.98	11.66	.86	.02	.11	.70**	.54**	1	
WB	25.97	5.87	.86	.17*	-.29**	-.20*	-.36**	-.32**	1

Note: **. p < .01, *. p < .05
ARRC = cognitive reappraisal, ARSE = expressive suppression, DS = drive for thinness, BU = bulimia, NC = body dissatisfaction, WB = well-being

The scores for cognitive reappraisal are high, M = 30.17, SD = 6.19, for expressive suppression the scores are low, M = 13.80, SD = 5.53. For drive for thinness scores are relatively low, M = 24.44, SD = 8.78, for bulimia scores are very low, M = 16.72, SD = 8.02, and for body dissatisfaction scores are low, M = 30.98, SD = 11.66. For well-being, scores are high, M = 25.97, SD = 5.87.

At the same time, there are significant positive correlations between cognitive reappraisal and well-being, r = .17, p < .05, and significant negative correlations between expressive suppression and well-being, r = -.29, p < .01. Drive for thinness is significantly and negatively associated with well-being, r = -.20, p < .05 and also bulimia, r = -.36, p < .05 and body dissatisfaction, r = -.32, p < .01.

Skewness and kurtosis are in the range (-2, 2), which reflects a normal data distribution. There were no missing cases and no cases were removed from any of the statistical analyses.

Hypoteses testing

H1. *Eating disorders are significantly negatively associated with well-being*.

H1a. *Drive for thinness is significantly negatively associated with well-being*.

H1b. *Bulimia is significantly negatively associated with well-being*.

H1c. *Body dissatisfaction is significantly negatively associated with well-being*.

In order to test this hypothesis, a multiple linear regression analysis was performed with the three types of eating disorders as predictors and well-being as the dependent variable.

Table 2. *Multiple linear regression analysis for eating disorders as a predictor of well-being*

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	SE	β	t	p
DS	.09	.08	.13	1.14	.26
BU	-.21	.07	-.29	-3.04	.00
NC	-.13	.06	-.25	-2.22	.03

Note: R^2 = .16
DS = drive for thinness, BU = bulimia, NC = body dissatisfaction

Eating disorders are found to be responsible for 16% of the variance in well-being, with the regression equation being statistically significant, F(3, 139) = 8.75, p < .01. Of the three predictors, only two are significantly negatively associated with well-being, namely bulimia, β = -.29, t(143) = -3.04, p < .01 and body dissatisfaction, β = -.25, t(143) = -2.22, p < .05.

Considering this result, we can say that hypothesis H1 is largely supported by the analyzed data.

H2. *Emotional self-regulation moderates the relationship between eating disorders and well-being*.

Four moderation analyses were conducted to test this hypothesis, with bulimia and body dissatisfaction as alternative predictors, cognitive reappraisal and expressive suppression as alternative moderator variables, and well-being as dependent variable. Moderation analyses could not be carried out for drive for thinness, as no significant correlation was found between the predictor and the dependent variable.

Table 3. *Moderation estimation for cognitive reappraisal in the relationship between bulimia and well-being*

			95% CI			
	Estimate	**SE**	**Min.**	**Max.**	**Z**	**p**
Bulimia	-.25	.06	-.37	-.14	-4.52	< .001
Cognitive reappraisal	.14	.07	.00	.29	1.97	.05
Bulimia ✻ Cognitive reappraisal	.00	.01	-.01	.02	.38	.70

We find that cognitive reappraisal does not moderate the relationship between bulimia and well-being, b = .00, CI = 95%(-.01, 02), Z = .38, p = .70.

Table 4. *Moderation estimation for cognitive reappraisal in the relationship between body dissatisfaction and well-being*

			95% CI			
	Estimate	**SE**	**Min.**	**Max.**	**Z**	**p**
Body dissatisfaction	-.17	.04	-.25	-.09	-4.24	< .001
Cognitive reappraisal	.18	.07	.03	.32	2.40	.02
Body dissatisfaction ✻ Cognitive reappraisal	.01	.01	-.01	.02	.79	.43

It is observed that cognitive reappraisal has no moderating effect on the relationship between body dissatisfaction and well-being, b = .01, CI = 95%(-.01, 02), Z = .79, p = .43.

Table 5. *Moderation estimation for expressive suppresion in the relationship between bulimia and well-being*

			95% CI			
	Estimate	**SE**	**Min.**	**Max.**	**Z**	**p**
Bulimia	-.20	.06	-.32	-.09	-3.45	< .001
Expressive suppression	-.26	.08	-.42	-.11	-3.30	< .001
Bulimia ✻ Expressive suppression	-.01	.01	-.03	.01	-1.13	.26

The relationship between bulimia and well-being is not moderated by expressive suppression, b = -.01, CI = 95%(-.03, 01), Z = -1.13, p = .26.

Table 6. *Moderation estimation for expressive suppression in the relationship between body dissatisfaction and well-being*

			95% CI			
	Estimate	**SE**	**Min.**	**Max.**	**Z**	**p**
Body dissatisfaction	-.13	.04	-.21	-.06	-3.48	< .001
Expressive suppression	-.28	.08	-.44	-.13	-3.59	< .001
Body dissatisfaction ✻ Expressive suppression	-.02	.01	-.03	-.00	-2.30	.021

The relationship between body dissatisfaction and well-being is moderated by expressive suppression, b = -.02, CI = 95%(-.03, -.00), Z = -2.30, p < .05.

Table 7. *The relationship between body dissatisfaction and well-being at different values of expressive suppression*

			95% CI			
	Estimate	**SE**	**Min.**	**Max.**	**Z**	**p**
Mean	-.13	.04	-.21	-.06	-3.42	< .001
Low (-1SD)	-.05	.06	-.16	.07	-.79	.43
High (+1SD)	-.22	.05	-.32	-.12	-4.40	< .001

At average levels of expressive suppression, the negative relationship between body dissatisfaction and well-being weakens, b = -.13, CI = 95%(-.21, -.06), Z = -3.42, p < .01. This relationship is further weakened at high levels of expressive suppression, b = -.22, CI = 95%(-.32, -.12), Z = -4.40, p < .01.

Given this result we can say that the H2 hypothesis is supported to a small extent by the data analyzed.

4. DISCUSSION

The role of emotional self-regulation in the relationship between eating disorders and well-being has been investigated in a number of studies in the literature (Blasczky-Schiep et al., 2019).

Nevertheless, little research has contributed to understanding the moderating role of various variable on this relationship (Brannan & Petrie, 2011).

Considering these aspects and the amount of literature on the topic, the main objective of the present study was to identify possible relationships between eating disorders, well-being and emotional self-regulation. By analyzing the possible associations between these variables, the results obtained can contribute to existing knowledge and at the same time, enhance our understanding of the associations between eating disorders and well-being, and other factors that may amplify or reduce those correlation, such as emotional self-regulation. More specifically, the main objective of this study is to investigate the correlation between eating disorders and well-being and to investigate how emotional self-regulation can moderate this relationship.

The results of this study provide an overview of the research purpose. Participants scores on cognitive reappraisal are high, which may indicate that most respondents have a tendency to change their perspective on a potentially distressing situation in order to reduce the influence of negative emotions about that situation. In the study conducted by Cutuli (2014), it was noted that a number of experimental studies have found that individuals who use cognitive reappraisal as an emotional self-regulation strategy produce a positive impact on their affective state. This is due to the minimization of negative emotional experience and the negative behavior accompanied by this experience, without physiological activation in this sense (Cutuli, 2014). Participants in this study also reported high scores on well-being. We understand from these scores that the respondents show an adequate level of satisfaction with life and a reasonable level of well-being. A high level of well-being could be an indicator of satisfaction with the way they live their lives as well as an indicator of optimal mental health (Keller, 2019).

The scores for expressive suppression and body dissatisfaction were low. The low scores for expressive suppression may indicate that some respondents in this study do not consistently use this technique to avoid emotional expression, whereas the low scores for body dissatisfaction suggest the idea that most of the participants in this study are not necessarily dissatisfied with their bodies. In other words, they are not overly concerned with the way their bodies look. It has been shown that expressive suppression could effectively shape behavioral expression, but not emotional experience, which is only inhibited (Gross, 2002). We can therefore assume by the low scores in this study that participants are not making an effort to shape their behavioral response. Furthermore, it has been found that limited use of any modality of emotional self-regulation may present more obvious bulimia symptomatology, and further research into expressive suppression in eating disorders is suggested (Vuillier et al., 2021). Studies have shown that there is an association between higher body dissatisfaction scores and bulimic eating disorders (Brannan & Petrie, 2011). This would indicate that the participants in this study were not at increased risk for bulimia. In addition, higher levels of body dissatisfaction are associated in Tylka (2004) research with a greater susceptibility to report higher levels of eating disorder related symptoms. Scores for drive for thinness are relatively low and for bulimia scores are very low. Therefore, it can be said that the low eating disorder scores in the present study indicate a lower predisposition to have some form of eating disorder.

The first hypothesis, which tested whether eating disorders are significantly negatively associated with well-

being, is largely supported by the data analyzed in this study. Our results found that eating disorders are responsible to some extent for the variation in well-being, with regression equation being statistically significant. That being said, the present study indicates that there is a statistically significant negative relationship between both bulimia and body dissatisfaction and well-being. No statistically significant correlation was noted between drive for thinness and well-being. Looking in more detail at the results of the study in comparison to other research, bulimia was a significantly negative predictor of well-being in other studies as well. For example, the study by Magallares (2012) also identified that bulimia determined a lower level of well-being in women at risk of developing eating disorders. In addition, the significant negative relationship between body dissatisfaction and life satisfaction has been recognized in other studies (Góngora, 2014). These results confirm that the possibility of developing an eating disorder can generate lower well-being. This is supported by research that highlights the significant negative impact that eating disorders can have on both psychological and subjective well-being (Tomba et al., 2013).

The moderating role of emotional self-regulation was also investigated in this study. Results indicated that there is a significant interaction of expressive suppression on the relationship between body dissatisfaction and well-being. Thus, at medium values of expressive suppression, the negative relationship between body dissatisfaction and well-being diminishes. This means that when the level of expressive suppression is medium, the negative effect of eating disorders on well-being is reduced. The results may be consistent with other findings in this area. Specifically, studies show that people with eating disorders more frequently adopt emotion regulation strategies considered to be maladaptive that adaptive ones (Leppanen et al., 2022). Moreover, at high values of expressive suppression, the negative relationship between body dissatisfaction and well-being becomes even weaker. At first glance, these results may seem to be counterintuitive, as the literature supports that expressive suppression has negative effects on well-being if used excessively (Gross & John, 2003). The association between expressive suppression and low psychological well-being has also been recognized among patients with other mental disorders, such as major depression (Abler et al., 2010). However, there are also studies that support these findings in this study. Some research states that expressive suppression can be beneficial in different circumstances of everyday life, as it helps to control the expression of emotions in accordance with certain desirable behaviors in specific situations (Kühn et al., 2011). Therefore, the results of this study may point the idea that individuals using this emotional self-regulation technique may improve their well-being to some extent.

Considering cognitive reappraisal as a moderating variable, our results showed no significant interaction with either if the two disorders (bulimia, body dissatisfaction) significantly negatively correlated with well-being. Other studies have found a link between cognitive reappraisal and body dissatisfaction (McLean et al., 2010). Furthermore, cognitive reappraisal has been related to improved psychological health in areas related to interpersonal functioning and well-being (Cutuli, 2014). A meta-analysis by Hu et al. (2014), examined the association between the two emotional self-regulation strategies, also measured in this study, and mental health. The conclusions drawn suggest that there are significantly negative relationships between suppression and well-being. At the same time, reappraisal would have the greatest positive impact on well-being levels (Hu et al., 2014).

Considering these results, the hypothesis that emotional self-regulation might have a moderating effect on the relationship between eating disorders and well-being is therefore supported to a small extent by the data analyzed in the present study. These results indicate that expressive suppression may be considered a component whose implications for well-being of individuals who manifest body dissatisfaction need to be given more consideration.

Practical implications

Taking into account the results of this study, it would be worth developing and implementing psycho-educational or counselling projects or programs to increase the population's awareness of the threat brought by the probability of developing an eating disorder. In the way, people could become more cautious about their eating habits and the external, as well as internal factors that can influence their health and well-being. Results from other studies confirm that developing emotional self-regulation abilities for people already diagnosed increased their ability to protect themselves from the negative consequences of eating disorders and can be very helpful in their recovery process (Ruscitti, 2016).

Improving emotional regulation ability in therapeutic intervention could be useful for managing negative emotions and stress levels. These manifestations may be commonly present among people who have a strong predisposition to develop an eating disorder. Rumination and difficulties in accepting one's own emotional states can frequently occur in anxiety and depressive disorders, and interventions aimed at increasing emotional self-regulation skills could also be supportive in the follow-up treatment of people with eating disorders (Leppanen et al., 2022). As a result, individuals may also become more capable of changing the negative self-perceptions that can commonly occur in individuals at risk of developing eating disorders (Manaf et al., 2016).

A complete integration of all the variables examined in this study may be provided by Emotional Focused Therapy (EFT). In this therapeutic method, one of the four major principles of the therapeutic process involves the regulation of emotions. Therefore, this therapeutic approach could help individuals to become conscious of their own emotions, to accept them and to make sense of the emotional experience (Greenberg, 2006). Moreover, effective handling of emotions is thus correlated with the promotion of well-being (Greenberg, 2006). In addition, this form of therapy has also

been shown to be effective in treating eating disorders. The potential of individual EFT interventions as a psychological treatment for treating binge eating disorder has been noted (Glisenti et al., 2018). Hence, specific interventions in emotion-focused therapy could teach people regulate their emotions and prevent or lessen the threat of eating disorder in their lives (Ivanova & Watson, 2014).

For these reasons, implementing programs to promote and raise awareness of mental health, and consciousness the role of emotions in everyday life, would be worth considering.

Limitations and further research

As with any study, we must consider limitations and recommendations for future research. For that reason, the present study has a number of limitations, which will be mentioned in the following.

One of the limitations of this study is the relatively small number of participants. In our future research we will consider a greater number of participants, preferably people who already have a certified diagnosis of an eating disorder. This will enable us to gain a more comprehensive understanding of the specific challenges faced by those with an eating disorder diagnosis. A potential limitation of this study may also be the administration of the questionnaire in an online survey. In terms of whether or not the participants in this study were fully honest in their responses, it is possible that the data they provided may be subject to some degree of bias. Taking these aspects into account, we propose to use in our future research both self-assessment tools through questionnaires and structured interviews, managed by qualified personnel, in order to obtain data more consistent with the actual manifestations of the participants (Garner et al., 2010). Also, with regard to the gender of participants, a limitation would be the relatively small number of male respondents. In future research, it is recommended to include more subjects.

Regarding the measurement of eating disorders, the limitation of this study would refer to the fact that only the composite subscale for the risk of developing an eating disorder was used to measure this variable. This is relevant to the sample used, as participants were not required to have a diagnosis in order to complete the study questionnaire. It is recommended that future research should also include the administration of a clinical sample in order to measure specific eating disorders.

Ultimately, in the present research, the two emotion regulation techniques: expressive suppression and cognitive reappraisal were only considered to measure emotional self-regulation. In future research efforts, it is recommended to explore more emotional regulation techniques and strategies, proven in the literature to have an impact on the other investigated constructs.

Conclusions

The results revealed a significant negative relationship between eating disorders and well-being. Moreover, significant moderation was observed from expressive suppression, as an emotional self-regulatory strategy, on the relationship between body dissatisfaction, as a predisposition to developing an eating disorder, and subjective well-being. These finding have substantial implications, primarily for understanding the symptomatology manifested by individuals with a tendency to develop eating disorders, but also for understanding the implications of these manifestations for the well-being of individuals. Regarding the confirmed hypothesis H1, this result is consistent with previous studies that have shown that people with a diagnosis of an eating disorder tend to have lower levels of well-being. Referring to hypothesis H2, the result of this study supports this assumption to some extent. This may be because people who choose expressive as a way of regulating their emotions may benefit from an improvement in the relationship between eating disorders risk and well-being. We also need to consider that we can often find ourselves in situations where we cannot change what is happening, but instead the power lies within us, in the choice we make about how we react to the situation. It is recommended that future research examine these relationships in more detail, in a more elaborate context, and attempt to identify and utilize other variables that may have an effect on those correlations.

Although the present study has a number of limitations and inconsistencies, our study can be seen as a significant contribution to the existing literature, as it investigated a relatively unexplored effect in terms of the moderator variable, emotional self-regulation. Further research is recommended on the enhancement of emotional self-regulation strategies and their implications in various mental disorders, as well as their consequences for the well-being of individuals.

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STUDIA DOCTORALIA
PSYCHOLOGY AND EDUCATIONAL SCIENCE
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VIRTUTE ET SAPIENTIA

Testing the HERA Model for Episodic Memory in a Sample of Students

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ARTICLE INFO

Article history:
Received 24-January-2024
Accepted 28-April-2024
Available online 01-May-2023

This article should be cited as: Chiracu, A., Buică-Belciu, C. (2024). Testing the HERA Model for Episodic Memory in a Sample of Students. *Studia Doctoralia. Psychology and Educational Science, 15*(1), 46-54. https://doi.org/10.47040/sdpsych.v15i1.172

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ABSTRACT

The aim of this study is to test Hemispheric Encoding/Retrieval Asymmetry model – HERA for episodic memory in a sample of students. A number of 64 right-handed students participated in the study, aged between 18 and 47 years (M = 20.66, SD = 4.84), 62 females (97%). Laterality was measured with Edinburgh Handedness Inventory and only right-handed students were included (with right laterality quotient ranging between 75 and 100, M = 99.92, SD = 4.38). The experimental design was inspired by the study of Propper et al. (2013). Participants were randomly assigned in one of the five conditions. Memory stimuli consisted of a list of 36 words and clenching stimuli consisted of 5 cm diameter rubber balls. It was hypothesized that right hand clenching (left hemisphere activation) pre-encoding and left hand clenching (right hemisphere activation) pre-recall, would result in superior episodic memory. One way ANOVA and Fisher LSD post hoc test were performed. Results supported the HERA model.

Keywords: *HERA model, episodic memory, hand clenching, word stimuli*

1. INTRODUCTION

Memory is one of the most fascinating human cognitive processes. Its study has interested numerous authors over time, proposing a series of theories and proving empirically and through functional neuroimaging that there are several types of memory and several ways of activating the brain circuits responsible for them. Episodic memory is a complex set of human cognitive processes that allow the encoding, storage and intentional recollection (retrieval) of unique events associated with the context in which they occurred (Baddeley et al., 2001). Wheeler et al. (1997), in an attempt to clarify this concept, established two distinct directions for defining episodic memory. The first refers to memory that renders possible conscious recollection of personal happenings and events from one's personal past and mental projection of anticipated events into one's subjective future. The second refers to a type of memory task and to performance on the task. Episodic memory in this sense refers to the acquisition of propositional information on a

particular occasion (declarative, cognitive, or symbolically representable) and its retreval on a subsequent occasion. The typical laboratory list-learning task in which participants are exposed to a collection of verbal items and then tested for what they have learned by recall, recognition, or some kind of memory judgment is often classified as an episodic memory test (Wheeler et al., 1997).

In the present study we aim to investigate episodic memory in the second definition of the term.

The role of the cerebral hemispheres in memory processes

It is already well known that the two cerebral hemispheres do not contribute equally to cognitive activities (Gazzaniga, 2000). The best example of hemispheric asymmetry is language, with the left hemisphere being significantly more involved than the right hemisphere. In neuroscience, memory is defined as a combination of three components: encoding, storage and retrieval. Previous studies have shown that there are differences in the contribution of the two hemispheres to certain memory processes. Despite the anatomical and physiological similarity of the two cerebral hemispheres, they have different information processing capabilities. These differences are found in the nature of the perceptual information that each hemisphere processes preferentially or in striking asymmetries for higher cognitive functions (Hellige, 1993). The different patterns of sensory analysis and the subsequent selection of responses suggest that the two brain hemispheres differ fundamentally in the records they retain of an experience, differences that are reflected in the way memory is processed. While left prefrontal cortex (PFC) is more involved in encoding, right PFC is more involved in retrieval (Ward, 2015). Thus, during learning a new material (encoding), the left PFC tends to be more active than the right PFC, while during recall or recognition (retrieval), the right PFC tends to be more active than the left PFC. This pattern of operation has been called the Hemispheric Encoding/Retrieval Asymmetry model (HERA) (Tulving et al., 1994). Although there were studies that reported exceptions to the HERA pattern, numerous others, based on positron emission tomography (PET) or functional magnetic resonance imaging (fMRI), confirmed the existence of the general HERA pattern (Cabeza & Nyberg, 2000; Fletcher & Henson, 2001), respectively a higher involvement of left PFC in cognitive tasks.

Activation of contralateral cerebral hemispheres through hand contraction

Contraction of the right or left hand leads to increased neural activity in the frontal lobe of the contralateral hemisphere (Harmon-Jones, 2006; Peterson et al., 2008). Electroencephalographic (EEG) reports have shown that left hand clenching for about 90 seconds increases right hemisphere activity, and right hand clenching increases left hemisphere activity. In a study on the effects of hand contraction on the persistence of hemispheric asymmetry, Beckman et al. (2013) showed through EEG that athletes who grip a ball in their left hand immediately before starting their sports activity did not show performance deterioration under severe pressure, a phenomenon determined by priming of the dominant right hemisphere. Hirao and Masaki (2019) also showed that squeezing a ball harder for a long period will lead to stronger asymmetrical activity by increasing the activation of motor-related areas. Hoskens et al. (2020) demonstrated the activation of the contralateral cerebral hemisphere after unilateral contraction of the hands in a study on motor performance, analyzing through EEG the connectivity between the left verbal-analytical temporal region and the motor planning region. The results of the study showed that hand contractions influence the extent of verbal-analytical engagement during motor planning, which in turn influences motor performance.

Goldstein et al. (2010) observed that unilateral hand contraction can affect cognitive performance by selectively activating either the right or the left hemisphere. Although numerous studies have shown that unilateral contraction of the hands or facial muscles can activate the contralateral cerebral hemisphere, having effects on emotional and motivational reactions (Peterson et al., 2008; Schiff et al., 1998), Goldstein et al. (2010) were among the first researchers to demonstrate the existence of cognitive effects as a result of hand contraction in a verbal creative problem solving task.

At the same time, Noufi and Zeev-Wolf (2021) showed that the contraction of the left hand and the implicit activation of the right hemisphere led to the improvement of novel metaphor comprehension. The logic of these studies starts from the fact that unilateral muscle contraction activates sensory and motor cortical areas in the contralateral cerebral hemisphere. By means of a mechanism of spreading activation to other cortical regions, a great diversity of emotional, motivational, attentional and cognitive processes can be influenced.

Harmon-Jones (2006) showed that contracting the left hand affects the functioning of the right frontal cortex, which is consistent with the assumption of spreading activation, which can explain why motor behaviors are able to enhance certain cognitive processes. Gable et al. (2013) tested the causal contributions of hemisphere activation to global-local processing. To manipulate the activation of the cerebral hemispheres, the participants engaged in contralateral hand contractions. The activity and attentional scope were measured through EEG. Right-hand contractions caused greater left-cortical activity than left-hand contractions. The results of the study showed that manipulating the left cerebral hemisphere improves the global attentional

process, and manipulating the right cerebral hemisphere improves the local attentional process.

Propper et al. (2013) conducted a study on the effects of hand clenching on episodic recall using the HERA model. Their results not only confirmed the HERA model, but also the fact that simple hand contraction can be used as a means by which the functional specializations of the cerebral hemispheres can be investigated in humans.

Starting from the above, the present study aims to test the HERA model on a sample of Romanian students, using hand clenching to activate the cerebral hemispheres responsible for memory encoding and memory retrieval. Therefore, we will assume that participants who will use right hand clenching to activate the left cerebral hemisphere before encoding a list of words, and who will use left hand clenching to activate the right cerebral hemisphere before words retrieval, will retrieve more words than participants in other conditions.

2. METHODOLOGY

Participants

A number of 64 students participated in this study, all of them enrolled in the first and second study year at the University of Bucharest, Faculty of Psychology and Educational Sciences, Department of Special Education. The age of the participants ranged between 18 and 47 years, M = 20.66, SD = 4.84. Two of them were males (3%) and 62 females (97%), all of them right-handed, right laterality quotient ranging between 75 and 100, M = 99.92, SD = 4.38. Laterality was measured with the Edinburgh Handedness Inventory (Oldfield, 1971). Only right-handed participants were kept because they tend to exhibit greater functional lateralization effects than do left-handed people (Hellige, 1993). All participants also had normal or corrected-to-normal visual acuity. The initial number of participants was 74, but ten of them registered right laterality quotient lower than 75, so they were eliminated from the study. Participants were not rewarded in any way, and enrollment in the experiment was voluntary. They were randomly assigned to one of the five hand clenching conditions:

1. CLE - CRR (clenching left hand before encoding - clenching right hand before recalling),
2. CLE - CLR (clenching left hand before encoding - clenching left hand before recalling),
3. CRE - CLR (clenching right hand before encoding - clenching left hand before recalling),
4. CRE - CRR (clenching right hand before encoding - clenching right hand before recalling),
5. Control (no clenching).

The experimental design was inspired by the study of Propper et al. (2013).

Table 1. *Distribution and number of participants according to assigned condition*

Condition/ Participants	1. CLE-CRR	2. CLE-CLR	3. CRE-CLR	4. CRE-CRR	5. Control
Initial (n = 74)	16	15	16	15	12
Effective (n = 64)	14	12	14	13	11

Materials

Memory stimuli consisted of a list of 36 words chosen at random from the list of 72 words used by Tulving et al. (1982). The words were translated into Romanian.

Clenching stimuli. Participants in conditions 1, 2, 3, 4 were instructed by the experimenters to squeeze a 5 cm diameter rubber ball in their hand (left or right) as hard as they could for two sets of 45 seconds each, with a 15 second break between them. Participants in condition 5 (control) were instructed to hold the ball with both hands without squeezing it.

Procedure

The participants were tested in groups of eight, in a room within the faculty, isolated from the rest of the rooms, so that there were as few external stimuli as possible (noises, lights, etc.). Response forms for each participant were printed on paper, with the condition (1, 2, 3, 4, or 5) indicated on the form. Students randomly drew a form, which implicitly imposed the condition as well. Initially, 74 students drew forms: 16 for condition 1, 15 for condition 2, 16 for condition 3, 15 for condition 4, and 12 for condition 5. Each of the five groups was trained separately in a short session in that the experimenter explained the task to them and exemplified how they would have to clench the ball in one hand or the other. In a group of eight participants, students from all five conditions could be found. After the participants entered the room, the experimenter gave them the balls and made sure that each participant understood what task they had to perform.

Stage 1. The participants completed pre-encoding clenching, that is, they clenched the ball for 45 seconds in their right or left hand for conditions 1, 2, 3, 4 or held the ball with both hands without clenching it for condition 5. After the first 45 seconds of clenching followed 15 seconds of rest, then another 45 seconds of clenching with the same hand. The two sets of 45 seconds each and the 15-second break

were timed and signaled to the participants by a timer sound. During the two sets of 45 seconds of clenching, participants were asked to look at a white projector screen, and focus on an "X" positioned in the center of the screen.

Stage 2. The participants were presented with the memory stimuli, the 36 words, through a set of slides made in PowerPoint, set to run one after the other at an interval of five seconds. The words were written in Courier New capitals, 28 point, but were projected onto the projector screen, so the actual size was much larger.

Stage 3. After the presentation of the 36 words, participants were asked to complete the Edinburgh Handedness Inventory (Oldfield, 1971) and another laterality questionnaire, the Waterloo Handedness Questionnaire (Coren, 1993), as a filler.

Stage 4. The participants completed pre-recall clenching, the procedure being identical to that of Stage 1, with or without hand change, depending on the assigned experimental condition.

Stage 5. The participants were asked to fill in as many as possible of the 36 words presented, on the response form, in paper and pencil. They were given 10 minutes for this task.

The total duration of the experiment from Stage 1 to Stage 5 was approximately 20 minutes.

3. RESULTS

To test the HERA model, we performed a one-way ANOVA for the five conditions, CLE - CRR (clenching left hand before encoding - clenching right hand before recalling), CLE - CLR (clenching left hand before encoding - clenching left hand before recalling), CRE - CLR (clenching right hand before encoding - clenching left hand before recalling), CRE - CRR (clenching right hand before encoding - clenching right hand before recalling), Control (no clenching), measuring the following variables: the number of correct words, the number of incorrect words (not found in the memory stimuli), the total number of written words (correct words plus incorrect words). The statistical analysis program IBM.SPSS 24 (IBM Corp, 2016) was used.

The highest number of correct words recalled was for participants in the CRE-CLR condition, M = 14.36, SD = 3.93, compared to participants in the CLE-CLR condition, M = 13.58, SD = 3.23, to participants in the CRE-CRR condition, M = 13.08, SD = 4.07, to participants in the CLE-CRR condition, M = 10.29, SD = 2.97, and to participants in the control group, M = 11.45, SD = 3.88.

The largest number of incorrect words recalled was in the participants in the CLE-CRR condition, M = 2.43, SD = 2.28, compared to the participants in the CRE-CLR condition, M = 1.86, SD = 1.23, to the participants in the CRE-CRR condition, M = 1.23, SD = 1.59, to participants in the control group, M = 1.00, SD = 1.18, and to participants in the CLE-CLR condition, M = .92, SD = 1.31.

The highest total number of total words (correct and incorrect) was in participants in the CRE-CLR condition, M = 16.21, SD = 4.30, compared to participants in the CLE-CLR condition, M = 14.50, SD = 3.03, to participants in the CRE-CRR condition, M = 14.31, SD = 4.01, to participants in the CLE-CRR condition, M = 12.71, SD = 2.20, and to participants in the control group, M = 12.45, SD = 3.11.

Table 2. *Descriptive statistics for the three variables in the five conditions*

						95% CI	
		N	M	SD	SE	Lower	Upper
Correct	CLE-CRR	14	10.29	2.97	.79	8.57	12.00
	CLE-CLR	12	13.58	3.23	.93	11.53	15.64
	CRE-CLR	14	14.36	3.93	1.05	12.09	16.63
	CRE-CRR	13	13.08	4.07	1.13	10.62	15.54
	Control	11	11.45	3.88	1.17	8.85	14.06
	Total	64	12.56	3.84	.48	11.60	13.52
Incorrect	CLE-CRR	14	2.43	2.28	.61	1.11	3.74
	CLE-CLR	12	.92	1.31	.38	.08	1.75
	CRE-CLR	14	1.86	1.23	.33	1.15	2.57
	CRE-CRR	13	1.23	1.59	.44	.27	2.19
	Control	11	1.00	1.18	.36	.21	1.79
	Total	64	1.53	1.65	.21	1.12	1.94
Total	CLE-CRR	14	12.71	2.20	.59	11.44	13.98
	CLE-CLR	12	14.50	3.03	.88	12.57	16.43
	CRE-CLR	14	16.21	4.30	1.15	13.73	18.70
	CRE-CRR	13	14.31	4.01	1.11	11.89	16.73
	Control	11	12.45	3.11	.94	10.37	14.54
	Total	64	14.09	3.60	.45	13.20	14.99

The ANOVA tests for correct words was significant, F(4, 59) = 2.78, p < .05, with an effect size η2 = .16; for incorrect words was insignificant, F(4, 59) = 2.12, p > .05, with an effect size η2 = .13; for total number of words was significant, F(4, 59) = 2.59, p < .05, with an effect size η2 = .15 (Table 3).

Table 3. *One-way ANOVA analysis for the three variables in the five conditions*

		Sum of Squares	df	Mean Square	F	Sig.
Correct	Between Groups	147.11	4	36.78	2.78	.04
	Within Groups	780.64	59	13.23		
	Total	927.75	63			
Incorrect	Between Groups	21.57	4	5.39	2.12	.09
	Within Groups	150.37	59	2.55		
	Total	171.94	63			
Total	Between Groups	121.73	4	30.43	2.59	.04
	Within Groups	693.71	59	11.76		
	Total	815.44	63			

For a more detailed analysis of the results, the Fisher LSD post hoc test for simple effects was performed.

Table 4. *Post-hoc Fisher LSD test for **correct words** – simple differences among the five conditions*

		MD			95% CI	
(I) Cond	(J) Cond	(I-J)	ES	Sig.	Lower	Upper
CLE-CRR	CLE-CLR	-3.30*	1.43	.03	-6.16	-.43
	CRE-CLR	-4.07*	1.38	.00	-6.82	-1.32

There are significant differences only between CLE-CRR and CLE-CLR, MD = -3.30, p < .05, CI95%(-6.16, -.43) and between CLE-CRR and CRE-CLR, MD = -4.07, p < .05, CI95%(-6.82, -1.32).

Figure 2. *Graphical representation for the means of correct words in the five conditions*

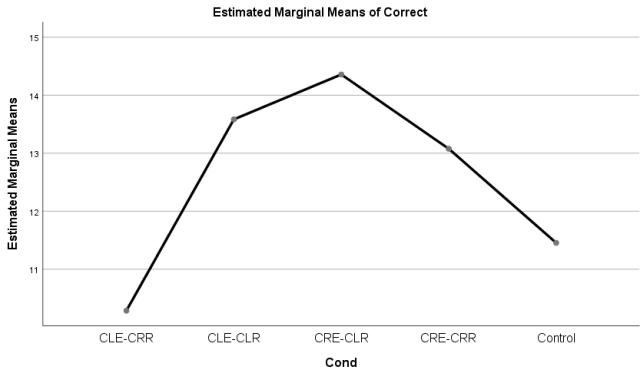


Table 5. *Post-hoc Fisher LSD test for **incorrect words** – simple differences among the five conditions*

		MD			95% CI	
(I) Cond	(J) Cond	(I-J)	ES	Sig.	Lower	Upper
CLE-CRR	CLE-CLR	1.51*	.63	.02	.26	2.77
	Control	1.43*	.64	.03	.14	2.72

Although the ANOVA analysis was not statistically significant, simple differences were observed between the five conditions, namely between CLE-CRR and CLE-CLR, MD = 1.51, p < .05, CI95%(.26, 2.77) and between CLE - CRR and Control, MD = 1.43, p < .05, CI95%(.14, 2.72).

Figure 3. *Graphical representation for the means of* ***incorrect words*** *in the five conditions*

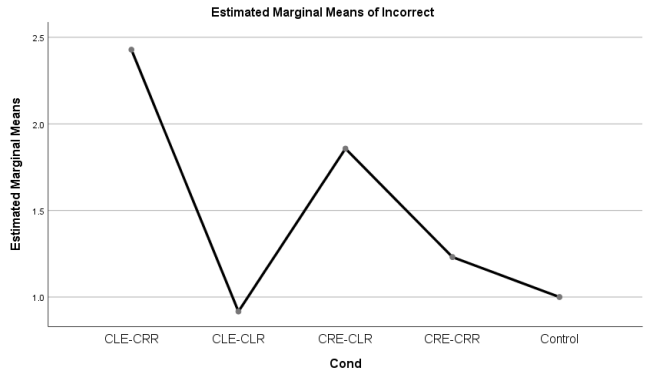
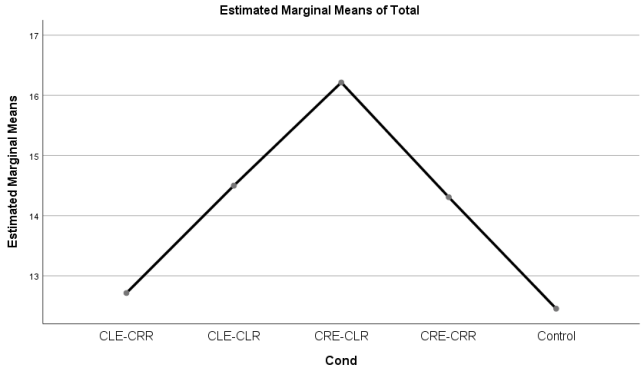


Table 6. *Post-hoc Fisher LSD test for* ***total number of words*** *– simple differences among the five conditions*

		MD			95% CI	
(I) Cond	(J) Cond	(I-J)	ES	Sig.	Lower	Upper
CLE-CRR	CRE-CLR	-3.50*	1.30	.01	-6.09	-.91

There are significant differences only between CLE-CRR and CRE-CLR, DM = -3.50, p < .05, CI95%(-6.09, -.91).

Figure 4. *Graphical representation for the means of* ***total number of words*** *in the five conditions*



4. DISCUSSION

The aim of the study was to test HERA model for episodic memory in a group of volunteer students. The results support the HERA model, in the sense that the number of correct words recalled by the participants was higher for those who activated their left cerebral hemisphere pre-encoding through right hand clenching and their right cerebral hemisphere pre-recalling through left hand clenching, compared to the participants in the other four conditions. Thus, participants in the CRE-CLR condition demonstrated better episodic memory. The results of Fisher LSD test for simple differences also support the HERA model for episodic memory, the highest differences being observed between the participants in the CRE-CLR condition and those in the CLE-CRR condition. At the same time, differences were observed between the participants in the CLE-CLR condition and those in the CLE-CRR condition, which underlines the importance of the activation of the right cerebral hemisphere for memory recall. Thus, participants who activated their right cerebral hemisphere pre-recall demonstrated better episodic memory.

Regarding the incorrect words, the largest number was observed in participants in the CLE-CRR condition. This result can be attributed to the fact that the activation of the right cerebral hemisphere pre-encoding does not support the memorization capacity to the same extent as the activation of the left cerebral hemisphere, and the activation of the left cerebral hemisphere pre-recalling does not support the retrieval of correct words. This fact is also reinforced by the differences between the participants in the CLE-CRR condition and those in the control group, the latter reporting a lower number of incorrect words in the situation where they did not activate either of the two cerebral hemispheres.

The total number of retrieved words, correct and incorrect, was higher in the participants in the CRE-CLR condition, with significant differences between them and those in the CLE-CRR condition. This result points to the retrieval of a larger number of words overall, thus a stronger activation of the left cerebral hemisphere.

Our study supports HERA model for episodic memory and is congruent with the results previously obtained by Tulving et al. (1994), Habib et al. (2003), Propper et al. (2005), Harmon-Jones (2006), Peterson et al. (2008), proving once again that: i) hand clenching activates contralateral cerebral hemisphere, and ii) left cerebral hemisphere is more involved in memory encoding, while right cerebral hemisphere is more involved in memory recalling.

Precautions and practical implications

Although the results of the present study support the HERA model and the different roles of the two cerebral hemispheres in the memory processes, it should be taken into account that the stimuli were a list of disparate words. The literature also presents studies that do not support HERA model for other types of stimuli, such as pictorial stimulus (artificial images generated by computer, silhouettes of common objects). Thus, Andreau and Torres Batan (2018) failed to support the HERA model for pictorial stimuli, but supported the model including pseudowords. It is therefore possible that the nature of the stimuli influences the memory processes, the authors considering that HERA enhances a specific pathway: when memorizing words, not only their semantic content is accessed, but they are recognized and rehearsed subvocally by converting graphemes into phonemes (Andreau & Torres Batan, 2018).

In an encoding task, Kelley et al. (1998) observed that: the activity of the right cerebral hemisphere was higher when the participants had to memorize words, the activity of the left cerebral hemisphere was higher when the participants had to memorize unfamiliar human faces, and both hemispheres were activated equally when memorizing the names of common objects. Wagner et al. (1998) observed an increased activation of the left hemisphere for verbal materials and increased activation of the right hemisphere for non-verbal materials, keeping encoding or retrieval tasks constant.

All these results sometimes question the HERA model, leading to different opinions. One such opinion is that the main determinant of hemispheric involvement in memory tasks is the nature of the material to be memorized, and the encoding and retrieval processes only modulate this determination (Epstein et al., 2002; Gazzaniga, 2000; Miller et al., 2002). Another opinion is that the hemispheric asymmetry between encoding and retrieval is only apparent and that it reflects the asymmetry between verbally oriented processing during encoding and less verbally oriented processing during retrieval (Lee et al., 2000a, b; Owen et al., 1996).

Despite these criticisms, the HERA model remains a benchmark that continues to be tested through the most sophisticated neuroimaging techniques, most of which confirm its credibility. From this perspective, we believe that the use of the model in educational practice can have important benefits in the learning process of students. If the activation of the contralateral cerebral hemispheres is possible through hand clenching, then programs for students can be developed, based on simple physical exercises, which lead to the activation of the left cerebral hemisphere, responsible for encoding, immediately before the teaching of some lessons (especially those with pronounced verbal support) and to the activation of the right cerebral hemisphere, responsible for retrieval, immediately before knowledge assessment tests.

Such a possible program can only be beneficial for students, while also contributing to the improvement of attention and preparation in advance of learning and testing. Moreover, students may be attracted to the idea that they can activate a certain cerebral hemisphere through their own actions, so they may pay more attention and become more interested in learning. Also, the implementation of a program based on physical exercises dedicated to the activation of the brain hemispheres specific to the learning context, is consistent with the new trends to introduce sports exercises in student classes with the aim of improving cognitive processing in general. Therefore, the HERA model can be the basis of such programs, starting from the premise that physical exercise is associated with higher cognitive performance, problem solving and memory (Bidzan-Bluma & Lipowska, 2018; Hillman et al., 2008; Tomporowski, 2003).

Limitations and further research directions

The present study presents a number of limitations. One of these is the small number of participants and the predominantly female gender. In addition, the participants were students, so generalizing the results should be done with caution. Also, students were not tested separately, but in groups of eight, which could have influenced the results to some extent, as students from all five conditions were included in one group. As a future research direction, we aim to use different stimuli (not only verbal), but also to attract groups of participants from among students with and without learning disabilities.

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