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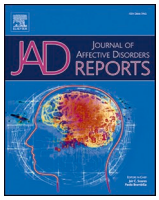

Research Paper

Psychological and cognitive complaints in individuals with love addiction

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ABSTRACT

Background: Individuals with love addiction (LA) may experience psychological, social, and cognitive difficulties in everyday life. However, no study has explored the psychological symptoms, subjective cognitive complaints, and personological aspects associated with LA. The present study aimed to investigate the psychological, behavioral, and cognitive correlates of LA by comparing individuals with high (H-LAI) and low (L-LAI) levels of LA and to clarify the role of resilience and coping style as protective factors of LA.

Methods: The online questionnaire used to recruit the sample included the Love Addiction Inventory (LAI) to assess the levels of LA and cognitive failures, resilience, coping style, depression, and anxiety assessment. Participants were equally divided into H-LAI and L-LAI groups based on the median LAI value.

Results: The questionnaire was completed by 600 participants (446 females; mean age = 29.5, SD = 9.44). Compared to L-LAI, H-LAI participants were younger and showed more severe anxiety and depressive symptoms; moreover, they complained more frequently about memory and attention failures. Male sex was found to be a risk factor in the development of LA, resilience emerged as a significant protective factor.

Limitations: Longitudinal research is needed to better explore the causal link between love addiction and psychological or cognitive failures. Additionally, objective neuropsychological tests should deeply investigate this connection.

Conclusions: Our findings indicated a cognitive and psychological profile associated with love addiction characterized by more severe psychological symptoms and perceived cognitive failures. An early identification of individuals most at risk to develop love addiction and the implementation of timed strategies reinforcing resilience might avoid detrimental consequences.

1. Introduction

The experience of love, inherent to the human experience, has been a fundamental aspect of our emotional repertoire since ancient times. This natural inclination towards deeply affectionate connections with others can often manifest as a quasi-addictive phase, signifying the powerful and intrinsic nature of love. The intensity and natural foundation of love in our lives, as well as its characterization of an overwhelming attraction and infatuation, sets the foundation for deeper emotional connections and, therefore, it draws parallels between the irresistible appeal of love and the characteristics of addiction. Indeed, in some cases, individuals can perpetuate pathologically the infatuation for somebody and can develop an affective dependence (Sirvent-Ruiz et al., 2022) which is counted among the pathological addictions defined without substance.

Love addiction is a complex and multifaceted condition, characterized by an obsessive and compulsive preoccupation with romantic relationships, that often continues regardless of its negative outcomes (Reynaud et al., 2010). Individuals exhibiting love addiction behavior usually neglect their personal well-being, showing social withdrawal, loss of interest in activities and people outside the love relationship, and experiencing academic or work problems due to an excessive focus on their relationship (Earp et al., 2017). The prevalence of love addiction is estimated to be around 3–6 % in general adult population (Sussman et al., 2011), but it can grow up to 25 % if evaluated within specific populations such as young college students (Sussman et al., 2011). Love addiction shares similarities with other addictive behaviors, such as overwork (Andreassen et al., 2012), compulsive shopping (Andreassen et al., 2015), social media use (Andreassen et al., 2016), and physical

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exercise (Griffiths, 1997; Thaxton, 2016). Indeed, like the other problematic addictive behaviors, individuals with love addiction experience unfavorable emotions and feelings when separated from their partner. They show a powerful desire and longing to reunite with their significant other (i.e., craving symptom) as a coping mechanism during stressful circumstances, and they might even develop withdrawal and tolerance symptoms towards their desired partner (Costa et al., 2021; Griffiths, 2005; Sussman, 2010).

Since individuals with behavioral addictions can show concurrent substance abuse disorders and various other mental health conditions (Potenza, 2006; Starcevic and Khazaal, 2017), several studies have investigated the negative consequence of love addiction in terms of social (i.e., difficulty in maintaining professional and amicable relationship) or legal (i.e., using misappropriate funds to finance their addictive and intense romantic relationship, leading to potential legal repercussions) and psychological (i.e., anxiety and depression) consequences (Sanches and John, 2019). Moreover, some studies revealed that individuals with behavioral addictions reported cognitive deficits such as working memory, executive functions and difficulties in controlling impulses (van Timmeren et al., 2018; Zhou et al., 2016). Until now, scientific research on love addiction focuses on impulse control (a specific cognitive ability to resist a drive to perform an action) revealing a difficulty in controlling the urgency of seeing the partner and the urgent need to look for him/her or hear from him/her (Redcay and Simonetti, 2018; Sophia et al., 2009). However, if individuals with high level of love dependence show cognitive failures such as concentration problems, memory loss and decreased perception besides psychological symptoms has not yet been investigated and deserves to be explored.

To date, only few studies examined the relationship between love addiction experience and some psychological variables. Specifically, Salani et al. (2022) studied the relationship between love addiction, emotional dysregulation (i.e., managing and modulating negative emotions), alexithymia (i.e., ability to recognize, express and distinguish emotions) and childhood and adulthood attachment styles. Their results reported significantly higher levels of emotional dysregulation and alexithymia, parental control, and preoccupied attachment, and lower levels of parental care within the love addiction group. Moreover, they highlighted the mediating role of emotional dysregulation and alexithymia between childhood and adulthood attachment. Furthermore, another study confirmed a significant and positive associations between preoccupied and fearful adult attachment and love addiction (Gori et al., 2023). In this case, these relationships were totally mediated by self-esteem. These studies focused on the importance of attachment style during both childhood and adulthdood; however, they did not take into account cognitive variables and other psychological (e.g., depression, anxiety) and personological aspects.

Several studies investigated the role of resilience (i.e. an ability of successfully adapting to difficult or challenging life experiences, Lussier et al., 2007) on the development and the aggravation of behavioral addiction. These studies revealed that more resilient adolescents were found to be less likely to suffer from gambling addiction (Lussier et al., 2007). It has also been found that the level of alcohol consumed by college students is negatively correlated with their resilience (Johnson et al., 2011). Moreover, resilience has been demonstrated to be associated with internet gaming disorder (Yen et al., 2019) and it has been identified as a protective factor for internet addiction (Robertson et al., 2018). At the same time individuals with behavioral addiction show maladaptive and less effective (i.e., avoidance or denial) coping strategies (Chou et al., 2015; McNicol and Thorsteinsson, 2017). Specifically, these are people's traits that have been shown to be potential predictors and, therefore, protective factors in the development of other behavioral addictions (Bonfiglio et al., 2018; Canale et al., 2019; McNicol and Thorsteinsson, 2017; Robertson et al., 2018). However, the possible protective role of resilience as well as the adoption of coping strategies has not been investigated and deserves to be explored.

Taking into account the abovementioned assumptions and results from previous studies on behavioral addictions, the present study was performed in order to investigate if people with high levels of affective dependence i. complain more severe cognitive failures in everyday life and at work (i.e., errors in the workplace including blunders and memory lapses) and psychological symptoms (i.e., depression and anxiety); ii. show low level of resilience; iii. adopt less efficient coping strategies. Moreover, this study aims to clarify the possible role of resilience ability and use of coping strategy in the developing process of pathological love.

The issues investigated in the present study might be useful to better understand the mechanisms and risk factors underlying the development of affective dependency, emphasizing the importance of preventing and showing attention to dysfunctional behavior linked to this addiction.

2. Materials and methods

2.1. Participants

Participants were recruited through a cross-sectional survey methodology, employing an online questionnaire using Google Forms platform. Participation in the survey was open from July 01, 2022 to May, 31, 2023 and the completion of the questionnaire took approximately 25 minutes.

To recruit a large Italian sample, the questionnaire was widespread to friends, colleagues, acquaintances, and university students via a snowball sampling strategy using virtual environments (i.e., Facebook, WhatsApp, Instagram, and social virtual groups).

Respondents were included in the final sample if they were aged 18+, considering adult legal age and compulsory education according to the Italian schooling system.

All participants were required to provide their informed consent before completing the online questionnaire. The present study was approved by the Local Ethics Committee and performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki, alongside with the principles guiding the ethical and methodological practice of online research (Das et al., 2011; Hunter et al., 2018).

2.2. Structure of the survey and cognitive-psychological assessment

The survey's structure included the following sections: i) personal data, which comprised socio-demographic information (i.e., sex, age, and years of formal education according to the Italian schooling system), ii) evaluation of severity of love addiction by means of the Love Addiction Inventory (LAI), iii) evaluation of mental health status (anxiety and depressive symptoms) using the Italian versions of 7-item Generalized Anxiety Disorder scale (GAD-7) and 9-item Patient Health Questionnaire (PHQ-9), iv) evaluation of cognitive status by means of the Italian version of the Cognitive Function at work Questionnaire (CFWQ), the Italian version of the Ability subscale of Multifactorial Memory Questionnaire (MMQ-Ability section), the Italian version of Perceived Memory and Attentional Failures Questionnaire (PerMAFaQ), v) evaluation of level of resilience by means of the Italian version Brief Resilience Scale (BRS), vi) evaluation of coping strategies by means of the Italian version of the Coping Scale, vii) evaluation of social media addiction by means of the Italian version of the Bergen Social Media Addiction Scale (BSMAS).

The LAI (Costa et al., 2021) evaluates the presence of vulnerability to love addiction. It is composed by 24 items and answers are expressed on a Likert scale ranging from 1 ("Never") to 5 ("Very Often"). Higher scores indicate a more probable presence of love addiction.

The mental health status section consisted of the PHQ-9 and GAD-7 scales assessing depressive and anxiety symptoms (Kroencke et al., 2001; Spitzer et al., 2006), respectively. We used the translated versions of both tests available on the following website: Patient Health Questionnaire (PHQ) Screeners; https://www.phqscreeners.com/select

-screener (accessed 08 March 2024), which were shown to be valid and invariant across different sex, patient strata, and languages.

The Italian version of the CFWQ evaluates the subjective cognitive failures perceived at work (Heikkinen et al., 2021; Altieri et al., 2023). The Italian version consists of 26 items answered on a 3-point Likert scale from 0 ("Works well") to 2 ("Often difficult") with higher scores indicating more severe perceived difficulties.

The MMQ-Ability section evaluated the frequency of memory failures in different everyday situations (Raimo et al., 2016; Troyer and Rich, 2002). It consists of 20 items answered on a 5-point Liker scale from 0 ("Never") to 4 ("Always") with higher scores indicating more severe memory failures.

The PerMAFaQ (Santangelo et al., 2021) assesses subjective cognitive failures in everyday life activities. It includes 9 items divided into "attention" and "memory" sections. Each item is to be rated on a 5-point Likert scale ranging from 1 "never" to 5 "very often" with higher scores indicating more severe subjective cognitive failures.

The BRS (Santangelo et al., 2021; Smith et al., 2008) measures individual attitudes towards stressful situations. The scale has 6 items and answers are given based on a Likert scale ranging from 1 ("Totally disagree") to 5 ("Totally agree"). Higher scores indicate a self-reported ability to exhibit positive adaptive responses towards adverse situations.

The Coping Scale (Hamby, S.; Grych, J.H. and Banyard, 2013; Santangelo et al., 2021) evaluates the cognitive, emotional and behavioural approach used to tackle everyday problems (e.g., coping style). It is a self-report questionnaire, and it is composed by 13 items answered on a 4-point Likert scale ranging from 1 ("Mostly true") from 4 ("Not true"). Higher scores indicate the use of more efficient coping strategies.

The BSMAS (Monacis et al., 2017) evaluates social media addiction. It is composed of 6 items and answers are given on a 5-point Likert scale ranging from 1 ("Very rarely") to 5 ("Very often"). Higher scores indicate a greater use of social media.

2.3. Statistical analysis

Descriptive statistics were calculated for sociodemographic characteristics and for all psychological variables.

Median of the total LAI score was used to equally split the sample in participants with high and low levels of love addiction, based on other studies conducted on different clinical populations (Beiske et al., 2009; Bouchi et al., 2011; Cella et al., 2002; Zhang et al., 2010; 2011). Comparisons of demographic, psychological, and cognitive variables between participants with high and low levels of Love Addiction were performed by using *t*-test for independent samples.

Possible associations between LAI score (Cronbach's alpha= 0.955) and sociodemographic aspects, psychological (GAD-7, and PHQ-9 scores Cronbach's alpha= 0.891 and 0.881, respectively) and cognitive variables such as CFWQ (Cronbach's alpha= 0.893), MMQ-Ability section (Cronbach's alpha= 0.920), PerMAFaQ (Cronbach's alpha= 0.872), and levels of resilience (BRS scores, Cronbach's alpha= 0.878), coping strategies (Coping Scale scores, Cronbach's alpha= 0.745) and social media addction (BSMAS scores, Cronbach's alpha= 0.836) were explored using Pearson correlation coefficient.

Moreover, taking into account previous studies focused on factors associated with love addiction such as maladaptive coping strategies and low level of resilience, we perform multiple regression analyses to identify the most influential predictors of love addiction. In detail, we entered LAI score as dependent variable and sociodemographic (i.e., age, sex, educational level), coping and resilience variables as predictors. Statistical analyses were performed by using SPSS Statistics version 26.0 (SPSS Inc., Chicago, IL, USA).

3. Results

The survey was completed by 600 participants; there was no missing data. Most participants were women (74.33 %), aged 26–35 (50.83 %), had an educational level of graduation or higher (67.67 %), came from South of Italy (54.17 %) and were employed (60.5 %). Within our sample, 85.33 % was unmarried/maiden, 11.5 % was married and 3.17 % was divorced/separated or widower. Finally, 62 % of the total sample declared themselves to be engaged in a relationship. Median LAI score was 53.50 (24 - 120). All sociodemographic characteristics of the sample are summarized in Table 1.

3.1. Comparison between individuals with high and low levels of love addiction

The whole sample was equally divided into 300 participants with a LAI score > 53.50 (i.e., median of LAI; H-LAI group), while the remaining 300 participants had a score < 53.50 (L-LAI group). The two groups differed on age: participants belonging to H-LAI group were younger than those of L-LAI group. No significant difference emerged on sex and educational level.

As for psychological variables, the two groups differed on PHQ-9 and GAD-7: H-LAI group reported more severe depressive (PHQ-9) and anxiety symptoms (GAD-7) than L-LAI group. As for subjective cognitive variables, H-LAI group reported more severe memory failures (MMQ-Ability) and cognitive complaints at work (CFWQ) and in everyday life (PerMAFaQ) than L-LAI group. Finally, the two groups differed on BRS, BSMAS and Coping Scale scores; in detail, H-LAI group showed a lower score on BRS indicating less resilience capacity (BRS), a higher score on BSMAS and Coping scale indicating more severe social media addiction and a greater use of coping strategies than L-LAI group (Table 2).

3.2. Correlation analyses

Correlational analysis revealed a strong association between LAI total score and the GAD-7 ($r = 0.449$, $p < 0.001$), PHQ-9 ($r = 0.436$, $p < 0.001$) and BRS ($r = -0.431$, $p < 0.001$) scores; LAI total score were moderately correlated with CFWQ ($r = 0.293$, $p < 0.001$), PerMAFaQ total ($r = 0.320$, $p < 0.001$), PerMAFaQ memory section ($r = 0.234$, $p < 0.001$), PerMAFaQ attention section ($r = 0.336$, $p < 0.001$) and BSMAS ($r = 0.34$, $p < 0.001$) scores. Finally, weak correlations emerged between LAI total scores and the MMQ-Ability section ($r = -0.144$, $p < 0.001$), Coping scale ($r = 0.127$, $p = 0.002$) and age ($r = -0.107$, $p = 0.009$). No correlation emerged between LAI scores and other demographic characteristics (Table 3).

Table 1
Sociodemographic data of the sample.

Age	**18–25**	**26–35**	**36–50**	**51 or more**
	209 (34.83 %)	305 (50.83 %)	56 (9.34 %)	30 (5 %)
Sex	**Female**	**Male**		
	446 (74.33 %)	154 (25.67 %)		
Educational level	**Elementary**	**Middle school**	**High school**	**Degree and post-degree**
	1 (0.17 %)	11 (1.83 %)	182 (30.33 %)	406 (67.67 %)
Country	**North Italy**	**Center Italy**	**South Italy**	**Out of Italy**
	172 (28.67 %)	89 (14.83 %)	325 (54.17 %)	14 (2.33 %)
Marital status	**Unmarried/ maiden**	**Engaged/ Married**	**Divorced/ separated/ widower**	
	512 (85.33 %)	69 (11.5 %)	19 (3.17 %)	
Employment status	**Unemployed**	**Employed**		
	237 (39.5 %)	363 (60.5 %)		

Table 2
Comparison of on socio-demographical, psychological and cognitive variables.

	L-LAI (n = 300)	H-LAI (n = 300)	t/χ^2	p
Socio-demographical variables				
Age	30.43 ± 10.10	28.57 ± 8.64	2.423	**0.016**
Educational level (ys)	16.01 ± 2.50	15.67 ± 2.35	1.698	0.090
Gender (M:F)	71:229	83:217	1.258	0.262
Psychological variables				
GAD-7	8.88 ± 4.87	13.28 ± 6.99	−9.371	**<0.001**
PHQ-9	2.00 ± 0.36	2.62 ± 0.76	−9.261	**<0.001**
Cognitive variables				
BRS	19.99 ± 4.97	16.58 ± 5.40	8.038	**<0.001**
Coping scale	28.72 ± 6.31	29.76 ± 5.79	−2.103	**0.036**
CFWQ	9.79 ± 6.73	14.10 ± 7.61	−5.720	**<0.001**
PerMAFaQ – total score	17.77 ± 6.54	21.82 ± 7.35	−7.120	**<0.001**
PerMAFaQ – memory section	8.15± 2.98	9.39 ± 3.16	−4.933	**<0.001**
PerMAFaQ – attention section	9.62 ± 4.14	12.43 ± 4.87	−7.614	**<0.001**
MMQ – Ability section	56.76 ± 12.80	54.31 ± 13.33	2.290	**0.022**
BSMAS	12.19 ± 15.27	15.20 ± 5.93	−6.585	**<0.001**

Values displayed as Mean ± SD or proportions. n= number; L= Low; H= High; LAI= Love Addiction Inventory; SD = Standard Deviation; M=Male; F=Female; GAD-7= General Anxiety Scale-7; PHQ-9= Patient Health Questionnaire-9; BRS= Brief Resilience Scale; CFWQ= Cognitive Function at Work Questionnaire; PerMAFaQ= Perceived Memory and Attentional Failures Questionnaire; MMQ= Multifactorial Memory Questionnaire; BSMAS= Bergen Social Media Addiction Scale.

Table 3
Results for Pearson correlation analyses between LAI score and demographical, psychological and cognitive variables.

	r	p
Age	−0.107	**0.009**
Level of education	−0.069	0.089
Coping scale	0.127	**0.002**
BRS	−0.431	**<0.001**
PerMAFaQ-total score	0.320	**<0.001**
PerMAFaQ-memory section	0.234	**<0.001**
PerMAFaQ-attention section	0.336	**<0.001**
CFWQ	0.293	**0.001**
GAD-7	0.449	**<0.001**
PHQ-9	0.436	**<0.001**
MMQ-Ability section	−0.144	**<0.001**
BSMAS	0.336	**<0.001**

LAI= Love Addiction Inventory; BRS= Brief Resilience Scale; PerMAFaQ= Perceived Memory and Attentional Failures Questionnaire; CFWQ= Cognitive Function at Work Questionnaire; GAD-7= General Anxiety Scale-7; PHQ-9= Patient Health Questionnaire-9; MMQ= Multifactorial Memory Questionnaire; BSMAS= Bergen Social Media Addiction Scale.

3.3. Multiple regression analyses

Multiple regression analyses revealed that higher LAI scores were related to male sex ($\beta = -0.121$, $t = -3.247$, $p = 0.001$) and lower BRS scores ($\beta = -0.447$, $t = -11.101$, $p < 0.001$). No significant association was found between LAI scores and age, educational level and Coping scale. These results were not affected by multicollinearity problems (i.e., VIF < 2.5) (Table 4).

Table 4
Results for multiple regression analyses with LAI score computed as dependent variable.

	Multiple regression analysis			*95 % confidence limits*	
	Beta	*t*	*p*	*Lower*	*Upper*
Age	−0.027	−0.710	**0.478**	−0.221	0.103
Sex	−0.121	−3.247	**0.001**	−9.234	−2.273
Level of education	0.014	0.384	0.701	−0.508	0.755
BRS	−0.447	−11.121	**<0.001**	−2.009	−1.405
Coping Scale	−0.021	−0.538	0.591	−0.338	0.193

BRS, Brief Resilience Scale.

4. Discussion

The present study aimed to explore the cognitive and psychological aspects of people that present love addiction. Our results indicated that people with high levels of pathological love were younger and exhibited more severe anxiety and depressive symptoms compared to participants with lower LA symptoms. Moreover, we observed that individuals with a high level of love addiction complained more frequently about memory and attention disturbances in daily activities and cognitive difficulties in performing professional tasks than people with low levels of love addiction. Finally, male sex and resilience ability were found to be significant predictors of the possibility to develop love addiction.

In the present study, individuals with affective dependence were younger compared to those with low levels of LA. However, when performing correlational analysis, we found a significant buy very weak association between age and LAI score consistently with a previous study (Gori et al., 2023).

Considering psychological aspects, individuals with high levels of love addiction showed more severe anxiety and depressive symptomatology than those with lower levels, consistently with previous studies (Stravogiannis et al., 2018; Vendrame et al., 2012). These symptoms seem to be often experienced with the real (or hypothetical) loss of the partner (Fisher et al., 2010; Reynaud et al., 2010; Sophia et al., 2009). However, the relationship between love addiction and mood disorders might suggest that both are epiphenomena due to a dysfunctioning of some cerebral regions of the reward system including ventral tegmental area (VTA) bilaterally, ventral striatum, medial and lateral orbitofrontal/prefrontal cortex and cingulate gyrus (Aron et al., 2005; Fisher et al., 2010; Hollerman et al., 2000; Pessiglione et al., 2006; Porrino et al., 1984; Schultz, 2000; Wise and Hoffman, 1992). In fact, some studies evidenced an alteration of the reward system in people suffering from depression and anxiety (Bewernick et al., 2010; Williams, 2016) and in subjects who really lost their partners. In detail, the relationship between love addiction and mood disorders might be explained on the basis of an altered functioning of the cerebral regions engaged in both pathological addiction and mood disorders since the abovementioned brain regions are as associated with gains and losses, craving and emotion regulation (Fisher et al., 2010) and characterized by dopaminergic neurons tending to prolong their activity when a reward is delayed in coming (Schultz, 2000). Moreover, the association between love addiction and anxiety and depressive symptomatology might suggest that an individual with love addiction desires constantly the presence of partner (i.e., craving) both when one is happily or unhappily in love leading to an excessive worry and fear of losing the desired object, which are pivotal aspects of both love addiction and depression and anxiety.

The present study revealed that people with probable love addiction may have less resilience but use more frequently coping strategies. Given that resilience is defined as one of the most critical determinants closely correlated to perceived stress and life satisfaction (Bonfiglio et al., 2018; Canale et al., 2019) and as individuals' capacity to bounce back when exposed to ranges of misfortunes (Lussier et al., 2007), our results that people with love addiction showed a lower level of resilience might suggest that these are characterized by poor flexibility and adaptability to stressful events and everyday life changes. Indeed, some researchers found that perceived stress is linked to the possibility to fall into behavioral and substance addiction (Tavolacci et al., 2013). Our results from regression analysis evidenced that a low level of resilience is predictor of severity of love addiction and thus people with a low

capacity of overcome hurtful events as real or perceived interpersonal rejection might be address to non-pharmacological and/or pharmacological approaches that enhance resilience in at risk individuals. Moreover, our correlational results of an association between more frequent use of coping strategies and more severe love addiction did not indicate a causal relationship between the two constructs; however, they might suggest that some individuals could adopt romantic relationship as a coping response to stress and therefore might develop an intense fixation on their romantic partner similarly to individuals with alcohol abuse. It is possible that unresolved trauma can lead to love addiction as a coping mechanism to escape or numb painful memories and feelings associated with trauma as stated in a 2021 article published by Integrative Life Center (What is love addiction?, 2021).

Love addiction seems to be related with social media addiction. Recently, some studies demonstrated that social media addiction negatively affects romantic relationships because it led people to be jealous and suspicious and, moreover, it increases the possibility to deceive the partner (Abbasi, 2019). As anyone could experience during their lifetime, social media can also increase the possibility to look at what other people are doing in a certain moment; therefore, they could facilitate the opportunities to control the partner in every moment of the day. Furthermore, it was suggested a direct positive paths from fearful attachment, rejection sensitivity and psychopathy to social media addiction (Demircioğlu and Aslı, 2018), supporting the possibility to develop social media addiction associated with the constant fear to lose or to be rejected by the partner. Moreover, it is important to take into account that, as well as the other behavioral addictions, internet addicted people are characterized by a reduction in executive control leading impairments in cue-reactivity, craving, and decision making (Brand et al., 2014), that are aspects shared also with love addicted people.

In the present study, we explored whether cognitive failures were frequent in people with LA and found a positive association between higher score on LAI and higher score on memory difficulties scale (MMQ-Ability), on questionnaires measuring subjective cognitive complaints perceived both at work (CFWQ) and in everyday life (PerMA-FaQ). Specifically, individuals with LA reported more frequent cognitive failures both at work and in everyday life; this might be due to their excessive involvement with their partners, thus bringing them to be completely absorbed by the relationship. Therefore, their attention could be completely directed towards the partner, resulting in excessive stress and fatigue for other areas of life. Although some studies demonstrated the association between cognitive failures and other behavioural addictions such as mobile phone use (Hadlington, 2015; Wong et al., 2020), until now, no study focused on this link between pathological love and cognitive consequences. This aspect is very important and should be further explored to better understand this association and to promote specific therapeutic programs to prevent the development of a severe cognitive decline.

Finally, our study revealed that male gender is a predictor for the vulnerability to develop love addiction. Specifically, males were found to be more likely to show pathological love compared to females. Several studies demonstrated a link between attachment style, sex and the risk to develop behavioral and, specifically, sex addiction (Zapf et al., 2008). More precisely, sexually addicted men were shown to relate with insecure attachment styles (i.e., anxious and avoidant) (Zapf et al., 2008). Individuals with anxious attachment style tend to worry about being underappreciated or abandoned by their romantic partners and they yearn to get emotionally closer to their partners to feel more secure (Simpson and Rholes, 2017); while persons with avoidant attachment style tend to be more isolated and less likely to seek emotional support and use addictive behaviors to increase positive affect (Magai, 1999). This link between insecure attachment style and male sex might put man at higher risk for the develop of pathological love. This topic deserves to be better investigated. However, our finding is in line with other studies underlining a higher probability for men compared to women to show behavior addictions such as pathological gambling and compulsive sexual behavior (Odlaug and Grant, 2010).

This study has some limitations. First, our findings from correlational analysis and from a cross-sectional observational study did not reveal any causal relationship between love addiction and psychological and subjective cognitive failures. Therefore, this issue deserves to be better investigated with longitudinal studies on people with love addiction. In addition, to identify participants with “high” and “low” LA we applied median of LAI due to the absence of a cut-off score for the LAI or specific clinical criteria for a diagnosis of LA. This issue might limit the generalisability of the results. Furthermore, we did not apply correction for multiple comparisons in our analysis because they have often been criticized for being overly stringent or too conservative, for example, in terms of trade-off between risks of Type I and Type II errors (e.g., Garamszegi, 2006; Nakagawa, 2004; Perneger, 1998). Moreover, we evaluated cognitive failures with subjective measurements; therefore, the relationship between love addiction and cognitive dysfunctions deserves to be better investigated by objective, standardized neuropsychological tests. Finally, we enrolled individuals who participated on a voluntary basis; thus, the sample may be not representative of the population.

In conclusion, the present study revealed that people with probable love addiction were younger and showed more severe mood symptoms, complained more frequently of memory and attention disturbances during activities of daily living and during professional activities.

These findings indicated a psychological profile associated with love addiction characterized by more severe psychological symptoms and more frequent cognitive complaints. These results could also be useful for those who live close to people suffering from emotional dependency (e.g., friends, relatives, colleagues). Paying attention to these signs (e.g., changes in mood, cognitive complaints) could promote a path of awareness and, above all, support from the social network of love addicted people, preventing them from getting worse symptoms. Moreover, an early identification of people most at risk to develop love addiction and the implementation of non-pharmacological interventions such as psychotherapy and psychoeducation focused on the enhancement of resilience abilities might avoid the chronicization of these symptoms and detrimental consequences for individuals’ wellbeing and quality of life.

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CRediT authorship contribution statement

Chiara Giacobbe: Writing – review & editing, Writing – original draft, Methodology, Investigation, Data curation, Conceptualization. **Gianpaolo Maggi:** Writing – review & editing, Formal analysis, Data curation, Conceptualization. **Lorenzo Borrello:** Writing – review & editing, Investigation, Conceptualization. **Angelo Barone:** Investigation. **Clara Mastromarino:** Investigation. **Paolo Antonelli:** Writing – review & editing, Investigation, Conceptualization. **Gabriella Santangelo:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Investigation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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