COVID-19 pandemic and internet addiction in young adults: a pilot study on positive and negative psychosocial correlates

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RESEARCH PAPER

COVID-19 PANDEMIC AND INTERNET ADDICTION IN YOUNG ADULTS: A PILOT STUDY ON POSITIVE AND NEGATIVE PSYCHOSOCIAL CORRELATES

Francesca Scafuto, Rebecca Ciacchini, Graziella Orrù, Cristiano Crescentini, Ciro Conversano, Francesca Mastorci, Marika Porricelli, Angelo Gemignani

Abstract

Objective: During and after the lockdowns of the COVID-19 pandemic period, a strain was put on young adults who have taken refuge in the problematic use of internet, social media, gaming, and gambling. This paper aims to investigate possible correlates of Internet Addiction Disorder (IAD), hypothesizing anxiety, depression and perceived stress would promote addiction, while mindfulness skills, resilience and socialization would, conversely, hamper IAD, and promote, consequently, a more functional internet use.

Method: A pilot study was carried out with a sample of 31 young adults, recruited through a snowball sampling using social networks. Participants filled out an online questionnaire including the following measures: Internet Use, Abuse and Addiction (UADI), Beck Depression Inventory (BDI-II); State-Trait Anxiety Inventory (STAI-Y); Perceived Stress Scale (PSS); Five Facet Mindfulness Questionnaire (FFMQ); Mindfulness Attention and Awareness Scale (MAAS); Resilience Scale (RS-14). It was also administered an ad hoc questionnaire for the assessment of socialization behaviour (6 items) and gambling (2 items).

Results: All the measures, but socialization, showed adequate reliability. Our sample showed high levels of anxiety, stress, IA and gambling, while presenting low levels of resilience, the mindful skill of no-reactivity and socialization. The first hypothesis was confirmed, finding positive and significant correlations between Internet Addiction on one side and PSS, STAI-Y1, STAY-2, and BDI II on the other side. We also partially confirmed the second hypothesis about UADI negatively correlated with both RS-14 and Mindful Acting. Finally, no correlations were found between Gambling and IA.

Conclusions: In conclusion, the more one perceives an emotional overload with less stress-control, high anxiety, and depression, and the less one can leverage on the skills of mindful acting and resilience, the more one uses the internet as a strategy to escape from a threatening reality.

Key words: internet addiction, emerging adulthood, COVID-19 pandemic, resilience, mindfulness

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Introduction

Considerable rates of IA Disorders (IAD) and Internet Gaming Disorders (IGD) worldwide show Internet Addiction (IA) as a serious issue to address in modern society, especially for young adults and "digital natives" (Lozano-Blasco et al., 2022; Primack et al., 2017; Stevens et al., 2021).

Recently, COVID-19 pandemic has brought an increase of both internalizing and externalizing emotional and behavioural outcomes such as anxiety, depression, post-traumatic stress, paranoia, and sleep disorders (Ahmed et al., 2020; Conversano, 2021; González-Sanguino et al., 2020; Hossain et al., 2020; Marazziti et al., 2020; Orrù et al., 2021a; Şimşir et al., 2022), together with an escalation of aggressive behaviour and domestic abuse (Boxall et al., 2020). The invitation of governments and educational institutions to stay at home, spending more time on tech devices to communicate, work or study, became a way to continue social activities through online platforms. Nevertheless, a major psychological consequence of the COVID-19 pandemic and its restrictions turned out to be the higher incidence of IA, which might be considered as a new public health issue; research showed how internet use increased by more than 52% compared

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to the pre-pandemic period (Jokic-Begic et al., 2020; Khubchandani et al., 2021; Siste et al., 2020). Indeed, psychosocial effects of the pandemic were identified in increase of self-harm and suicidal behaviours, eating disorder, internet and video-games's addiction, sleeping disorders (Wang et al., 2020), panic and anxiety disorders (Codagnone et al., 2020; Li & Hasson, 2020; Qi et al., 2020).

The need of socialization especially in youngers could reasonably motivate the increase of internet use together with the increased Covid anxiety that has driven to compulsive online searches for health information (Magson et al., 2021). Online platforms were used as network supporting for quick communication about health (Monacis et al., 2018; Young, 2015) but they also contributed to spread incorrect medical information (Jokic-Begic et al., 2020) amplifying risk perception, anxiety, and fear that in turn gave rise to obsessive-compulsive behaviours and cyberchondria (Mrayyan et al., 2022; Orrù et al., 2021b; Rohilla et al., 2020).

Despite the high incidence of this phenomenon even before the pandemic, the fifth edition of Diagnostic and Statistical Manual of Mental Disorders (DSM-V) did not yet include IAD as a different category (APA, 2013) but in the range of the impulse-control disorders (Liu & Potenza, 2007). Indeed, IAD implies being out of one's control, significantly distressing, time-consuming, and leading to difficulties in one's social, professional, or financial life (Shapira et al., 2000). Therefore, internet problematic use was associated with strained social and intimate relationships, less time spent with family and at work, and the emergence or worsening of mental health issues (Beard, 2005; Chou et al., 2005; Mitchell, 2000).

Although several research have investigated psychological factors related to IA, such as anxiety, depression, loneliness, and social isolation (Ceyhan & Ceyhan, 2008; Tokunaga & Rains, 2010; Young & Rogers, 1998), the causal relationship between these variables has not yet been established (Chou et al., 2005). In the attempt to discover a causal order in the empirical relationships between subjective feelings of loneliness and depression and symptoms of Internet Addiction, Yao and Zhong (2014) found that excessive Internet use increased feelings of loneliness over time and that online social contacts might not be an effective replacement for offline interactions, suggesting the existence of a worrisome vicious cycle between IAD and loneliness.

For this purpose, this paper investigates the aforementioned variables as positive correlates of IAD that could work as risk factors in young adults during the pandemic (Ozturk & Ayaz-Alkaya, 2021; Putri et al., 2022), together with negative correlates, such as mindfulness skills and resilience, that could work as protective factors.

Positive correlates of IAD: anxiety, depression, and perceived stress in emerging adults

Emerging adulthood was defined as a critical period in the crystallization of internet problematic use especially during pandemic, because of the combination of social and environmental distress with isolation and fear of the pandemic (Dubey & Tripathi, 2020; Kandell, 1998; Lozano-Blasco et al., 2022; Masaeli & Farhadi, 2021;). Young adults, especially college students, face pressure from their social context, the commitment to study, friends, and families (Yan et al., 2014) which might result either in a "positive" push to increase performance skills or in a negative overload potentially at risk for mental health issues (Pulido Rull et al., 2011; Putwain, 2007).

As regards psychological risk factors, young adults who experience depression and loneliness would be particularly vulnerable to developing an IA. Lack of social support, loneliness and depression were already shown to be associated in a bidirectional way with problematic internet use in college students (Ceyhan, 2011; Günay et al., 2018; Kim et al., 2009). They would display irrational beliefs, i.e. how the offline world is terrible and/or how the online world is safer (Davis, 2001), and feelings of a lack in social skills, preferring anonymous and more manageable computer-mediated contacts rather than face-to-face interactions (Caplan, 2003, 2010; Joorabchi et al., 2022; Tateno et al., 2019). During the pandemic, IA was studied as a coping strategy aimed to reduce uncomfortable feelings like loneliness, depression, and social anxiety (Dong et al., 2020; Shadzi et al., 2020; Cui & Chi, 2021).

High anxiety also predicted IA through the mediation of the fear of disease during the COVID-19 pandemic (Servidio et al., 2021; Stavropoulos et al., 2017). Thus, the more people were anxious, the more they were scared to contract a disease, and the more they would refer to internet as a coping strategy to escape from unpleasant reality (Patias et al., 2021). This attempt to reduce discomfort turned out to be a dysfunctional choice since the addicted behaviour would conversely reinforce feelings of loneliness contributing to other psychological disorders (Akin & Iskender, 2011; Yao & Zhong, 2014; Young & Rogers, 1998), such as depression and, providing odds of long-term mental illness, especially for adolescents and emerging adults (Arslan & Coşkun, 2022; Ferraro et al., 2006; Hasan, 2019; Muratori & Ciacchini, 2020; Schimmenti & Caretti, 2010, 2017). It is widely known that some psychological issues, such as depression, anxiety, and PTSD after traumatic events, tend to be recursive and can lead to long-term damage to mental and physical health (Carmassi et al., 2014; Dell'Osso et al., 2011; Dell'Osso et al., 2015; Di Giuseppe et al., 2020; Iasevoli et al., 2012; Miniati et al., 2021; Orrù et al., 2009; Orrù et al., 2020; Piccinni et al., 2012; Sartori et al., 2017).

Furthermore, IA has been framed as a dysfunctional coping mechanism to deal with high perceived stress (Gong et al., 2021). COVID-19 could be conceived as a collective and environmental stressor that might generate anxiety and avoidant coping strategies or if for instance it is accompanied by high self/collective efficacy might promote more functional coping strategies (Scafuto & La Barbera, 2016). Perceived stress was studied as a direct predictor of IA and an indirect predictor through the mediation of procrastination: when people are stressed, they may avoid unpleasant emotions through procrastination, that is delaying a behaviour until subjective discomfort is experienced. Internet use allows procrastination, giving an immediate pleasure and entertainment and at the same time encouraging the experience of flow, that is the overall feeling of a full engagement in an action (Gong et al., 2021). Hence, the flow experience may moderate the relationship between perceived stress and IA, showing that individuals who are more likely to experience online flow, may be more prone to use the Internet as an avoidance strategy to deal with stress. A meta-analysis showed that an inadequate stress management strategy increased the chance of developing an IA (Koo & Kwon, 2014), while a review showed perceived stress to have a moderating effect on the relationship between social support and IA:

social support decreased IA in College students who less perceived stress, whereas students who were over stressed were more likely to have an IA problem in despite of social support (Chou et al., 2005).

Negative correlates of IAD: socialization, resilience, and mindfulness

The present study also assumed that some protective factors may prevent the emergence of IA during the pandemic. For instance, a maladaptive cognitive pattern and an individual avoidant coping strategy may amplify the risk that stressful life events degenerate in IA (Li et al., 2010).

Along with the literature on mental health, particular relevance is given to socialization (vs social anhedonia), resilience, and mindfulness skills to hinder psychopathological outcomes (Barnová & Tamášová, 2018; Conversano et al., 2020a, 2020b; Di Giuseppe et al., 2021; Di Giuseppe et al., 2022; Killgore et al., 2020; Schachter et al., 2022; Song et al., 2021).

Social anhedonia may be due to a lack of offline social skills and opportunities for in-person socialization (Silvia & Kwapil, 2011). People with social anhedonia who do not derive pleasure from social contact and interaction in daily life, are at risk for IA (Guillot et al., 2016; Shen et al., 2021a). Because of their poor performance in face-to-face interactions, they perceive social interaction to be unrewarding and threatening, and address the need to communicate through online social interaction (Caplan & High, 2007; Kim et al., 2009). Yu et al. (2023) showed that social but not physical anhedonia affected IA in college students. Furthermore, social isolation during the pandemic was associated with IA especially in adolescence (Wang et al., 2020).

Although definitions have evolved over time, resilience generally refers to positive adaptation, or the capacity to keep or gain back a regular condition in the face of adversity (Bagheri Sheykhangafshe et al., 2021; Kalisch et al., 2017; Li & Hasson, 2020). Resilience, as a "rebound ability," helps people more effectively adapt to major life stressors and prevent mental health problems (Tugade & Fredrickson, 2004; Xu & Yang, 2023). Improving coping mechanisms (Tang et al., 2014) and adaptations (Yao et al., 2013) were shown to prevent the risk of addictive online behaviours.

A recent study showed that IA mediated the relationship between psychological resiliency and depressive symptoms in Korean university students (Mak et al., 2018). Hence, high resilience would produce less depression, by decreasing IA. Students who were less resilient, also were more susceptible to addictive internet behaviours (Al-Gamal et al., 2016; Robertson et al., 2018), which were instead linked to an inadequate or maladaptive defensive mechanisms (Yao et al., 2013). Moreover, high resilience did not just predict a low social media misuse (Hu et al., 2017; Taş, 2019), but it was also negatively associated with online gaming addiction (Robertson et al., 2018).

Mindfulness has been defined as the ability to pay attention to the experiences in the present moment without passing judgment on them (Kabat-Zinn, 1994; Marlatt & Kristeller, 1999), with an open attitude and curiosity. It was associated with a wide range of psychosocial factors, that promote well-being, interpersonal happy relationships (Dekeyser et al., 2008; Follette et al., 2006) and decrease of mental health issues (Conversano et al., 2020a; Ghiroldi et al., 2020; Scafuto, 2021; Scafuto et al., 2022).

Research showed mindfulness was negatively related to IA and misuse (Arslan & Coşkun, 2022; Machimbarrena et al., 2018;), smartphone and facebook addiction (Kim et al., 2018; Zhang et al., 2020), video-gaming and pathological gambling (Riley, 2014). After a mindfulness-oriented therapy, most participants reported having learnt useful skills for stress reduction and emotion regulation and indeed did not meet any of the criteria for a video game addiction diagnosis according to standardized assessments at post-test and follow-up measures (Li et al., 2018).

Mindfulness may shield users from IA, especially by improving emotional and behavioural regulation abilities, in fact mindfulness supports stress management and positive adaptation by mediating people's reactions to stressful life events (Arslan, 2017; Keng et al., 2011) and reducing the negative impact of social isolation on IA (Arslan & Coşkun, 2022). Mindfulness might prevent addiction also by increasing cognitive processes, such as the ability to sustain attention over time and by reducing procrastination strategy for the everyday tasks (Schutte & Del Pozo De Bolger, 2020). Mindfulness practice would reduce mind-wandering levels, future-oriented and visual thoughts, and, consequently, decrease anxiety about the uncertainty of the future (Bortolla et al., 2022).

Moreover, mindfulness meditative skills, such as being aware of the present moment, were reported by the respondents as the most crucial facilitators for their well-being during the pandemic home confinement (Tanhan, 2020).

Aims and Hypotheses

The present study first aims to explore the correlations between psychological distress, such as anxiety, depression, perceived stress, and IA after the COVID-19 pandemic. Our first hypothesis states there are positive correlations with perceived stress, anxiety, and depression, since IA could be considered an emotion-focused coping strategy to deal with social and environmental stressors, such as the pandemic.

The study also aims to investigate the relationship between addiction and protective factors such as socialization, mindfulness and resilience skills. Our second hypothesis states negative correlations would emerge between resilience, mindfulness, and level of socialization on one side and IA on another side.

Method

Procedures

Participants were recruited through the snowball sampling method (via social media: Whatsapp, Facebook and Instagram). The inclusion criteria for the recruitment of participants were the followings: age 18-30 years (a) and university student status (b). At the beginning of the test, the participants were informed that their participation to the study was voluntary, and they could interrupt it at any time without needing to give any explanation and/or penalty. All the subjects accepted voluntarily to participate in the research, giving their informed consent before participating. This study did not envisage any compensation or payment for the participants.

Participants' demographics

The sample was composed of 31 young adults, mostly women (females 90.3%; age range *M*=26; *DS*=

8,61). Almost all the sample have already reached a bachelor's degree, were not married or co-living with partners (90,3%), with a 64.5% (20) that were full-time students of master's degree.

Measures

Test administration included socio-demographic questions (age, gender, civil status, job), standardized questionnaires and an ad hoc questionnaire which was specifically designed to investigate socialization and gambling after the COVID-19 pandemic. The period when the research was carried out was June 2022.

Ad-hoc questionnaire is composed of six items assessing Socialization level after the first lockdown of the pandemic in May 2020 till June 2022 (see Appendix). Participants were asked to respond of a change in social relationships, and to report the frequency of some social activities, answering on a 5-point scale: 1 (never), 2 (few times a year), 3 (one-two times a month), 4 (at least one time a week), 5 (almost every day).

Examples of items were: *"How often do you play sports with other people?"* or *"How often do you practice outdoor activities with your friends?"*

The scale showed a low internal reliability (α=.535). Other two items of the ad-hoc questionnaire evaluated the frequency of gambling behavior, after the pandemic (*r*=.92**). The items were: "*How often do you play to the new slot machine?"* and *"How often do you play games that allow you to win or to lose money?"*. Participants were asked to answer on the same 5-point scale varying from 1 (never) to 5 (almost everyday). Higher was the score, higher was the frequency of this type of play.

Use, Abuse, IA (U.A.D.I.)

The UADI scale originally proposed and validated by Del Miglio et al. (2001), investigated the relationship between the Internet use and related psychological phenomena (attitudes, motivations, emotions, behaviours and symptoms). In our study, internal reliability was more than adequate (α=.93). IA is evaluated in five factors, every one composed of 15 items for a total of 75 items. The factors are: Escape (ESC), which investigates the Internet use as an escape from an unpleasant reality; Dissociation (DIS) which refers to dissociative symptoms, such as depersonalization; the Impact on real life (IMP) which assesses the effects of internet misuse on the relationships, work or study activities, Doing Experience (EXP) that identifies how individuals use internet to discover and put in action other aspects of themselves; finally Dependence behaviour (DEP) identifies behaviours of tolerance, abstinence, and compulsion related to internet use.

Examples of items are: "*My mood often improves when I am online"; "It's difficult for me disconnect from Internet*". The higher is the score and higher the risk of IA and abuse.

Five Facet Mindfulness Questionnaire (FFMQ)

The Italian version of FFMQ is a multifactorial rating scale to assess mindfulness skills with good psychometric properties (Didonna & Bosio, 2012) (original version by Baer et al., 2006). The FFMQ is a 39-items self-report questionnaire based on a five-factor model. These factors are: Observing: how we see, feel, and perceive the internal and external world around us and select the stimuli that require our attention and focus; Describing: the way we label our experiences and express them in words to ourselves and others; Acting with Awareness: the movements we choose after attending to the information present at the moment. Determines whether we act out of quick judgment and get out of 'autopilot mode' before responding to a situation; Non-judging: ability to be non-judgmental regarding our inner experience. It measures self-acceptance and empathy for oneself and others; Non-reacting: active detachment from negative thoughts and emotions so that we can accept their existence and choose not to react to them.

Higher total scores reflect a greater degree of state-like mindfulness (Giovannini et al., 2014). In our study, internal reliability was adequate (α = .87). Examples of the items are: *"When I take a shower or a bath, I stay alert to the sensations of water on my body"* (Observing); *"I'm good at finding words to describe my feelings"* (Describing); *"I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted"* (Awareness); *"I believe some of my thoughts are abnormal or bad and I shouldn't think that way"*(Non-judging); "*When I have distressing thoughts or images, I "step back" and am aware of the thought or image without getting taken over by it"* (Non reacting).

Mindfulness Attention and Awareness Scale (MAAS)

The MAAS is the one-dimensional scale that measures individual differences in daily mindful states, composed by 15 items (Brown & Ryan, 2003). The Italian validation showed good psychometric properties with higher scores indicating higher trait-like mindfulness (Veneziani & Voci, 2014). The internal reliability of the current study was adequate (α = .898). Some examples of the items are: *"I could be experiencing some emotion and not be aware of it until some time later"; "I drive places on 'automatic pilot' and then wonder why I went there"*.

Perceived Stress Scale (PSS)

The Scale was developed to measure subjective perceived stress levels; It is a measure of the degree to which situations in a person's life are assessed as stressful. The items were built to intercept the level at which people who respond to the test find their lives unpredictable, uncontrollable, or overloaded. The scale also contains several direct questions about current levels of perceived stress and refers to the last month. The PSS is a 14-item self-report scale, with higher scores indicating higher level of perceived stress (PSS; Cohen et al., 1983; Berardi et al., 2021; for the Italian validation see Mondo et al., 2021). The present study showed adequate internal reliability (α = .853). Examples of the items are: *"In the last month, how often have you been upset because of something that happened unexpectedly*?"; "*In the last month, how often have you felt that you were unable to control the important things in your life*?"

Resilience Scale (RS-14)

The Italian version of RS-14 scale (Callegari et al., 2016) was used to measure psychological resilience, defined by the means of this scale as the capacity to live

with purpose, perseverance, equanimity, authenticity, and self-reliance, with higher scores indicating higher levels of resilience (Wagnild, 2009). In our study internal reliability was adequate (α = .933). The scale is composed by 14 items. Examples of the items are: *"I usually manage one way or another"; "I keep interested in things".*

State-Trait Anxiety Inventory (STAI-Y)

The STAI-Y is a self-report questionnaire with two scales, each of one including 20 items, that measure state and trait anxiety separately. Both scales had been validated in an Italian sample (Spielberger, 1989). In our sample, internal reliability was adequate both for STAI-Y1(α = .915) and STAI-Y2 (α = .926). STAI-Y1 (S-Anxiety) is a transient reaction to a negative event, characterized by feelings of tension, apprehension, anxiety, and worry. The scale aims to assess how one feels "right now, at this moment". Some examples of the items were: *"I feel calm"; "I am presently worrying over possible misfortunes"*. STAI-Y2 (T-Anxiety), on the other hand, measures a more stable tendency to perceive stressful situations as dangerous or threatening. This scale assesses how one "generally" feels. Some examples of the items are: *"I am a steady person"; "I feel that difficulties are piling up so that I cannot overcome them".*

Beck Depression Inventory (BDI-II):

The BDI-II is a 21-items self-report questionnaire, that measures characteristic attitudes and symptoms of Depression (Beck et al., 1996) and it is based on the theoretical assumption that distorted beliefs are the core issue in depressive mood with higher scores indicating greater severity of symptoms (Montano & Flebus, 2006). In our study, internal reliability was very good (α = .941). Some examples of the items are: *Sadness: "I do not feel sad" (=0); "I feel sad much of the time" (=1); "I am sad all the time" (=2); "I am so sad or unhappy that I can't stand it" (=3); or Self-Dislike: "I feel the same about myself as ever" (=0); "I have lost confidence in myself (=1); "I am disappointed in myself" (=2); "I dislike myself" (=3).*

Results

Descriptive analyses

The diagonal of **table 1** shows high levels, above the cut-off, of UADI (>70), STAI Y-1 and Y-2 (>45).

RS-14 score was included in the moderately low to moderate range (65-81) while PSS was in the high range (14-26). BDI-II was the only score within the range of normality (*M*<20). Participants also used slot machines or internet gambling more than one day a week (*M*>4), while they were dedicating time to in-person socialization with friends almost one a month (*M*>2). Hence, the sample in average presented IA, higher levels of Trait and State Anxiety, difficulties to manage stress and emotions in comparison to normative populations, low in-person socialization, and weekly behaviours of internet gambling.

Correlational analysis

Positive and significant correlations (*Pearson* coefficients) emerged between UADI on one side and PSS, STAI-Y1, STAY-2 and BDI II on the other side, in line with the first hypothesis (**table 1**). Hence, the more

Table 1. *Analysis of correlations and descriptive statistics*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1.Gambling	4.77 (0.60)												
2.Socialization	-0.202	2.43 (0.40)											
3.UADI	-0.065	-0.037	177.5 (34.8)										
4.MAAS	-0.146	0.227	-0.236	58.5 (15.2)									
5.PSS	**.421***	-0.110	**.532****	**-.432***	21.3 (6.48)								
6.RS-14	-0.087	0.069	**-.369***	-0.046	-0.264	68.32 (13.8)							
7.Observing	-0.342	-0.107	-0.131	0.051	**-.369***	-0.100	25.34 (6.6)						
8.Describing	0.115	-0.090	0.034	0.235	-0.234	0.059	-0.079	28.85 (6.48)					
9.Acting	0.050	**-.445***	**-.528****	0.351	**-.428***	0.156	0.115	0.227	25.09 (6.48)				
10.Non-judging	-0.067	0.079	0.099	-0.059	-0.333	0.191	0.231	0.227	-0.057	20.48 (3.60)			
11.STAI-Y1	0.231	-0.082	**.396***	-0.321	**.646****	**-.608****	-0.292	-0.245	-0.327	-0.322	48.66 (10.23)		
12.STAI-Y2	0.103	0.136	**.557****	-0.238	**.680****	**-.638****	-0.178	-0.152	**-.566****	**-.404***	**.796****	47.82 (10.83)	
13.BDI II	0.156	0.295	**.548****	-0.265	**.538****	**-.628****	0.038	-0.219	**-.664****	0.001	**.602****	**.742****	12.69 (11.08)

*p<.05; **p<.01

one perceives to not have control on stressor events, is anxious and depressed, the more one shows an IA. The correlations appeared strong, with UADI-STAI-Y only presenting a moderate coefficient.

We also partially confirmed the second hypothesis about UADI negatively correlated with both RS-14 and Mindful Acting. No other facets of Mindfulness or MAAS resulted correlated with UADI. Among the psychological variables, we also found a negative correlation between MAAS, Observing on one side and PSS on the other side.

Finally, no correlations were found between Gambling and IA, showing they might be independent strategies that respond to different needs and between Socialization and UADI.

Beyond our hypotheses, further results could be underlined.

A positive correlation between Gambling and PSS emerged, that is the more one loses control on its life events, perceiving stress, the more also gambles.

A less intuitive result emerged about a negative correlation between Socialization and Acting with awareness. The facet of Mindfulness more correlated with other variables was Acting with awareness, that negatively correlated with Depression, Perceived Stress, Trait Anxiety, further than UADI. Hence, the more one dismisses the automatic pilot, focusing on the present moment, the less perceives stressors as threats, and the less is generally anxious and depressed. Trait anxiety also negatively correlated with non-reactivity, that is the more one is stably anxious the more over-reacts to thoughts, images, and feelings. Resilience negatively correlated with Anxiety and Depression, while did not with Mindful Acting. The highest correlations, as expected, were between Trait and State anxiety, and between Trait Anxiety and Depression. Second highest positive correlations were between PSS and both Anxiety scales.

All the subdimensions of UADI correlated, but dissociation and doing experience, showing that using internet to discover and put in action one's potential is a different dimension from dissociating that implies using internet as a way to dissociate from oneself, showing symptoms such as depersonalization (see **table 2**). If we compare the correlations between UADI subscales and the other variables, we found that all of them were positively associated with BDI-II (all $p < .001$). Moreover, Escape was also correlated with PSS (r=.59**), STAI-Y2 (r=.56**), and Acting with awareness (r=-.49**). Furthermore, it was the only dimension to correlate with RES-14 (r=-.42*) and STAI-Y1 (r=.51**). Trait Anxiety and PSS correlated with all dimensions but EXP (r=.31; r=.29, respectively), while Mindful Acting correlated with all but DEP (r=-.34).

Discussion

The aim of the present study was to start a pilot study to identify correlates of IA behaviour, that could work as possible risk or protective factors.

A sample of young adults was recruited, showing high levels of anxiety, stress, internet addiction and gambling, while presenting low levels of resilience and socialization. The high score on distress variables might represent the psychosocial impact of pandemic-Covid 19, but we cannot infer this assumption since our sample was small and not representative. Nevertheless, we could suppose that because of the strain and social restrictions of Covid Pandemic, individuals might have less referred to their defence mechanisms, such as the use of social support, that moderate the relationship between traumatic events and distress, showing higher levels of psychological suffering (Conversano et al., 2020b; Di Giuseppe et al., 2020, 2022).

IA resulted positively correlated to distress (anxiety, depression, and perceived stress), confirming the first hypothesis. What can help individuals that suffer of anxiety, depression, and perceive less control on the stress, is also what can help for dealing with addiction. Research has already found that especially young adults who present higher level of anxiety, depression, and stress, are more likely to develop IA since the misuse of internet could be an emotion-focused coping strategy to deal with their distress (Kuss et al., 2014; Schimmenti & Caretti, 2010, 2017). Previous studies already found a negative correlation between social media addiction and self-esteem, while a positive correlation between social media addiction and anxiety (Ciacchini et al., 2023). Comparing state and trait anxiety, just the stable disposition to feel anxiety was found to predict social media addiction in adolescents (Ciacchini et al., 2023).

It is less common to interpret this relationship in the opposite side, but we could refer to other outcomes showing how addiction also reinforces depression, stress, and state anxiety (Hasan, 2019; Muratori & Ciacchini, 2020; Yao & Zhong, 2014). Misuse of internet as a strategy to deal with stress is dysfunctional in managing one's suffering, thus it could increase rather than decrease emotional distress. Indeed, for instance the use of social network increases the comparison between our self-image and the appearance of others' happier lifestyle and images, causing more social appearance anxiety (Boursier et al., 2020).

The present study also partially confirmed the second hypothesis since IA was negatively correlated with resilience and the only mindfulness' facet of acting with awareness. Psychological distress and addiction were both negatively correlated with resilience and mindfulness. Resilience was negatively correlated with distress measures along with multiple studies that found resilience trait associated with mental health (Hu et al., 2017; Mak et al., 2018). It was also negatively associated with IA, confirming what literature found between the negative link of resilience and internet misuse (Al-Gamal et al., 2016; Robertson et al., 2018; Taş, 2019).

The result of a not direct correlation between resilience and mindful acting might point out a possible

Table 2. *Analysis of correlations between UADI subscales*

	1.	2.	3.	4.	5.
1. Escape (ESC)	36.64(9.55)	**.69****	**.58****	**.63****	**.76****
2.Dissociation (DIS)	**.69****	29.13 (7.67)	**.63****	.28	**.61****
3.Impact on the real life (IMP)	**.58****	**.63****	35.03(7.45)	**.39****	**.45***
4.Doing experience (EXP)	**.63****	.28	**.39****	32.5 (10.11)	**.49****
5.Dependence (DEP)	**.76****	**.61****	**.45****	**.49****	44.19 (8.58)

*p<.05; **p<.01

independence of two positive paths affecting internet addiction. More research is needed to investigate this hypothesis, since no previous studies have underlined the role of both factors to prevent IA.

The facet of mindfulness significantly correlated with IA and more correlated with the other variables was acting with awareness, that is dismissing the automatic pilot and paying attention to what is in the present moment. This result seems in line with previous studies that underlined the prominent role of acting with awareness in the promotion of a coherence between attitudes and behaviours (Amel et al., 2009; Wamsler et al., 2018). The ability to dismiss the automatic pilot was also found especially relevant in increasing the regulation of behaviours and decreasing impulsive disorders (Peters et al., 2011; Royuela-Colomer et al., 2021).

Mindfulness, measured as attention and awareness (MAAS) and as Acting with awareness, was negatively associated to the level of perceived stress, hence it might work as a protective factor towards the risk of emotional overload and the perception of stressors, i.e. pandemic, as unbearable threats. This result is in line with previous studies that found a negative correlation between most facets of mindfulness and the cognitive and emotional perception of environmental and collective stressors (Scafuto, 2019).

No direct association was found between socialization and addiction, nevertheless this result does not exclude a mediated effect of socialization on addiction through other variables that we did not consider in the present study. The fear of pandemic and the regulations on social distances, including on-line teaching, might have indirectly affected students' distress (anxiety, perceived stress), and increased the choice of dysfunctional strategies to cope with stressors, that is the misuse of internet and games whereas there were not enough resilience and dispositional mindfulness. Literature considers social isolation as a serious stressor that negatively affects several aspects of mental and physical health, such as immune system response, cognitive functioning, alcohol consumption, smoke addiction and depression (Hawkley & Capitanio, 2015).

It was a counter-intuitive result to notice a negative, rather than positive, correlation between socialization and acting with awareness. This result could be interpreted considering the pandemic and social restrictions that characterized the time when the study was carried out. Indeed, when we collected our data, the lockdown was finished but still there were some social restrictions. In this peculiar period, isolation could represent a responsible and attentive behaviour to safeguard self and others, especially if vulnerable, and thus who acts dismissing the automatic pilot, may also be more attentive to comply with the emergency restrictions. Indeed, there was a paradoxical choice between the basic need of social engagement that boosts psycho-physical health, and isolation, that could prevent infection but at the same time reduce psycho-physical health (Dell'Osso et al., 2011).

As result, it seems obvious that many people, especially youth who shape their identity through interaction with peers' group, have moved to cyberspace, where they could at least keep some type of social contact. It would also be possible that young adults, such as the sample we questioned, could have misused internet expressing symptoms and indicators of addiction, and could have reacted to the paradoxical choice and its emotional overload with social disengagement, increasing solitary games as gambling, and the escape in cyberspace.

Indeed, if we give a look to the subdimensions of addiction, it is noticeable that all of them correlated with depression, while the subdimension that highly correlated with all the variables was escape, that identifies internet use to escape from life difficulties and stressors. Escape refers to a strategy to regulate emotions, temporarily improving negative mood, and at the same time to express personal and social competences. Indeed, the more one perceives an emotional overload, with high anxiety, stress, and depression, and the less one can leverage on the skills of mindful acting and resilience, the more one uses the internet as a strategy to escape from a threatening reality. It is particularly intriguing that escape was the only dimension of addiction to correlate with state anxiety and with resilience. This could suggest that escape is a first level dimension of the addiction on what risk factors impact, before dissociation and dependence, and it could represent a direct reaction to an increased state of anxiety, especially when resilience is low (Blasi et al., 2019; Chen et al., 2019). If it represents the first level dimension of addiction, it could be suggested the relevance of programs to intervene initially on escape to prevent addiction.

Limitations, future research, and interventions

What we have just illustrated was a pilot study that had just exploratory aims with several limitations. First, the sample size was small to allow a generalization of the results to a larger population of young adults. Second, the measure of socialization behaviour included six items ideated ad hoc but with low reliability, while the ad hoc measure of gambling included just two items. Therefore, when we interpret the results including these measures, we cannot exclude that they are due to inadequate measurement. Third, there was not a correction for multiple comparisons that could partially explain the result of several significant correlations.

Future research might consider experimental (or quasi-experimental) designs to demonstrate causal links between protective factors and addiction and analyse processes of causality: for instance, how mindfulness and resilience programs might directly reduce addiction, and through the mediation of emotional distress (anxiety, depression) and social engagement (socialization). Given those results, we can provide some indications for programs that contrast IA, especially in times of collective trauma and threats such as pandemic.

First, we saw that what contrasts depression, anxiety, and perception of overloading stress, also contrasts addiction. In neurofunctional terms, the pandemic, as a collective threat, might activate the physiological response to stress, and dorsal vagal complex that inhibits social engagement and produce an unbalance of sympathetic system (Porges, 2007). Contemplative and mindfulness practices have been shown to activate, instead, the ventral vagal complex, that is involved in social engagement, and disactivates sympathetic nervous system (Poli et al., 2021). Consequently, programs based on mindfulness, that promote stress reduction, the release of the psycho-physical overload, and emotional regulation (i.e., emotional expression, cognitive reappraisal) might both reduce state anxiety and depression, and at the same time the need to escape in internet misuse. The result of a correlation between internet misuse and acting with awareness, points out the relevance of programs that should focus on

dismissing the automatic pilot and paying attention to what is in the present moment, since this mindfulness facet is the one that was revealed as especially lacking in internet addicts. The result of the involvement of the addiction dimension of escape also pays the way to plan training interventions on coping strategies alternative to internet misuse to escape from social and environmental stressors.

Especially in the stressful condition of isolation, training programs should not exclude the role of exposition to one's beloved (Beilin et al., 2005; Heinrichs et al.,, 2003), socialization, body contact, self-massage practices (Moschetti & Tortorella, 2007), and the promotion of feeling of trust (Blass et al., 1994) since all of them were shown to increase stress-moderating hormones, such as oxytocin (Dębiec, 2005). Besides, programs should promote both mindfulness and resilience, the attention to the present moment (that is similar to the resilient equanimity: "going with the flow and accepting what is there"), and the feeling of being a part of a bigger picture, or global self-awareness (Ghiroldi et al., 2020), that is similar to the resilient meaningfulness (or a belief that life has meaning) (Wagnild, 2009) and also recalls the eudaimonic dimension of purpose in life, that was associated to mindfulness programs such as Gaia in adolescents (Scafuto et al., in press).

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Appendix: Socialization Scale

Socialization scale: Please answer to the following questions, considering the period of time that started with the end of the first lock-down (May 2020) for Covid-pandemic till now (June 2022)

1. In comparison with the pre-Covid, did the meetings with your friends have any change after the end of the lock-down? How much do you meet your friends?

2. How much time do you spend with a "group"of friends?

3.How often do you play sports with other people?

4.How often do you practice your hobbies/recreative activities with other people?

5. How often do you go out with your friends in the evenings?

6. How often do you practice outdoor activities with your friends?