Universidade de Aveiro Departamento de Educação e Psicologia
2021

DIANA MARQUES FILIPE

THE GOOD, THE BAD AND THE UGLY: A RELAÇÃO ENTRE O USO DAS REDES SOCIAIS E O DESEMPENHO NUMA TAREFA DE CONTROLO DE RESPOSTA

Universidade de Aveiro **Departamento de Educação e Psicologia**
2021

DIANA MARQUES FILIPE

THE GOOD, THE BAD AND THE UGLY: THE RELATIONSHIP BETWEEN THE USE OF SOCIAL MEDIA AND INHIBITORY CONTROL IN A RESPONSE CONTROL TASK

Dissertação apresentada à Universidade de Aveiro para cumprimento dos requisitos necessários à obtenção do grau de Mestre em Psicologia da Saúde e Reabilitação Neuropsicológica, realizada sob a orientação científica da Doutora Sara Monteiro, Professora Auxiliar Convidada, e Doutora Isabel Santos, Professora Auxiliar, do Departamento de Psicologia e Educação da Universidade de Aveiro

o júri

Presidente

Professora Doutora Anabela Maria Sousa Pereira
Professora Associada com Agregação da Universidade de Aveiro

Doutora Ana Cláudia Pereira Bártolo
Investigadora Doutorada, Universidade de Aveiro

Professora Doutora Sara Otília Marques Monteiro
Professora Auxiliar Convidada

palavras-chave redes sociais, Adição às Redes Sociais, funções executivas, paradigma go/no-go, controlo inibitório, flexibilidade cognitiva

resumo Dado o atual debate em relação a se o Uso Problemático das Redes Sociais consiste ou não numa adição comportamental, o presente estudo teve como objetivo examinar as diferenças no controlo inibitório e flexibilidade cognitiva entre grupos de diferentes níveis de severidade de adição às redes sociais (sem risco, em risco, dependente), numa tarefa Go/No-Go Emocional. Os estímulos emocionais incluíram estímulos relacionados com as Redes Sociais (RS), e os estímulos neutros constituíram Sinais de Trânsito (ST). O paradigma envolveu duas tarefas principais: Condição RS-Go, onde os participantes responderam a estímulos das RS e ignoraram os ST; e a Condição ST-Go, onde desenvolveram a resposta contrária. A ordem das condições foi aleatorizada. O viés cognitivo e o controlo inibitório foram inferidos através da interação nível de adição às RS x Condição-Go, e a flexibilidade cognitiva pela interação nível de adição às RS x Ordem das Condições. Resultados principais indicaram a presença de um viés atencional em direção a estímulos das RS na Condição RS-Go no grupo em-risco e dependente das RS. O grupo dependente apresentou significativamente também uma melhor capacidade discriminativa na Condição RS-Go em comparação ao grupo em risco, mas apenas entre aqueles que começaram o paradigma com a Condição RS-Go. O grupo dependente revelou igualmente um viés decisional significativamente mais baixo na condição RS-Go em comparação ao grupo sem risco. Com a crescente utilização das RS, o presente estudo apresenta algumas implicações. Os resultados sugerem que indivíduos com uma severidade baixa-moderada de sintomatologia de adição às RS podem não estar interessados em controlar os seus padrões de uso às RS, em vez de apresentarem défices reais na sua capacidade inibitória.

keywords social Media, Social Media Addiction, executive functions, go/no-go paradigm, inhibitory control, cognitive flexibility

abstract Given the current literature debate on whether or not Problematic Use of Social Media can be considered a behavioral addiction, the present study had the purpose to examine the differences between different levels of Social Media Addiction (no risk, at-risk and addicted) in inhibitory control and cognitive flexibility, in an Emotional Go/No-Go Task. Emotional stimuli included Social Media (SM) cues, and neutral stimuli were Traffic Signs (TS). The paradigm involved two main tasks: SM Go, where participants developed a response to SM stimuli and ignored TF cues and a TS Go, where the contrary response occurred. Order of conditions was randomized. Attentional bias and inhibitory control were inferred from the interaction level of addiction x Go-Condition, and cognitive flexibility by the interaction level of addiction x Order of the Go-Conditions. Results showed the presence of an attentional bias towards SM cues in SM Go-Condition in the at-risk and addicted groups, but only in SM Go-Condition. The addicted group also showed a significantly better discriminative ability in SM Go-Condition than the at-risk group, but only among those who started the paradigm with SM Go-Condition. A lower decision bias was equally seen in the addicted group in comparison to the no-risk group. With the growing use of SM, this study has some implications. These results suggest that individuals with low-medium SM addiction symptoms severity may just not be interested in controlling their SM use patterns, instead of having real deficits in inhibiting their behavior.

Index

Figure Index

Abbreviations

Social Media – SM

Internet Communication Disorder - ICD

Social Media Addiction – SMA

Internet Gaming Disorder – IGA

Level of Addiction - LoA

d'- Discrimination ability

C – Decision Bias

Introduction

Definition and Characterization of Social Media

Social Network Sites (e.g., Facebook, Twitter, Instagram) are online platforms where individuals share personal information, connect with others, create and share content on various topics (Durak & Seferoğlu, 2019; Wegmann & Brand, 2016;). Its survival depends on a critical mass of active users, and each year a growth on numbers is seen (Clement, 2020). This growth is mainly due to the engagement of young adults (18-24) and adults (25-35) (Johnson, 2021). Furthermore, not only the number of users is increasing worldwide but also the daily time spent online in social media (SM) (Clement, 2020a).

The increased time spent on SM is to be expected within the modern world, as globalization and technology revolution occurred. The recent development of the smartphone and the easy access to SM that accompany it, places a great opportunity to its use and overuse (Wegmann et al., 2018). Therefore, we have seen a facilitation in the accessibility to information, communication, expression and creation of connections. Indeed, online social support, virtual social awareness and sense of belonging have been reported by users as positive experiences of social networking (Vannucci et al., 2017).

Social Media Addiction (SMA)

Although there is a positive side to internet and SM, characteristics of SM make situations like negative feedback, cyberbullying and overuse very likely to happen (Durak & Seferoğlu, 2019). Moreover, SM has reinforcing features that encourage its overuse, such as a variable interval schedule of reinforcement (with new posted content online) and the presence of pavlovian conditioned cues (e.g., mobile notifications referring to the availability of new content) (Hormes et al., 2014). As such, recent research has started to talk about Internet Communication Disorder (ICD), described as a overuse of internet communication tools (e.g., posting content or reading posts) associated to symptoms such as salience (preoccupation with and thinking about SM use), tolerance (where increased amounts of time are necessary to achieve the same hedonic reward), mood modification (to reduce guilt, stress, anxiety, depression or forget personal problems), withdrawal (with negative psychosocial and sometimes physiological symptoms like loss of control) interpersonal conflicts (social, professional or/and personal), neglect of interests and relapse (Griffiths & Kuss, 2017; Sindermann et al., 2020; Wegmann et al., 2018). It is

theorized that ICD is a dysfunctional coping mechanism for emotional and psychological distress that results in negative consequences in one's interpersonal functioning (Li et al., 2015). In literature, several authors refer to SMA in different manners such as ICD and Problematic Use of Social Media. For simplistic purposes, SMA nomenclature will be used throughout the text.

If SMA indeed comprehends a behavioral addiction, then it must share biopsychological constructs and deficits with other addiction disorders (Billieux et al., 2015). As such, symptoms and predisposing factors associated with SMA have been fairly examined in the past few years, in the lookout for similarities with recognized behavioral disorders. In fact, SMA symptoms mirror some of the symptoms of addiction disorders such as pathological gambling and substance abuse (Potenza, 2008), with additional boredom and intense craving being symptoms that have been found among individuals who were logged off of SM (Stieger & Lewetz, 2018).

Correlates and Negative Consequences of Social Media Overuse

Negative consequences such as feelings of loneliness, impaired social activities, psychological health, well-being or interpersonal relationships and difficulties in emotion regulation and functional coping strategies (e.g., experiential avoidance) have been linked to SMA (Andreassen & Pallesen, 2014 as cited in Wegmann & Brand, 2016; Hormes et al., 2014). Participants in a qualitative study by Li and colleagues (2015) reported feelings of anger and frustration after using internet, including SM, brought by certain content or a perception of having wasted time. Emotional distress such as sadness and depression symptoms were also mentioned, due to upward social comparisons; that is, comparing one-self to ones we believe are better or are in a more favorable social position.

Indeed, SM provides the perfect opportunity to exposure of unrealistic beauty expectations and for upward social comparisons, with studies suggesting a positive relationship between SM use and social comparison (Vogel et al., 2014). These characteristics may lead to a poorer mood when there isn't a synchrony between one's perception and the perception of the other as it has been shown before (Berry et al., 2018), and to a lower self-esteem (Vogel et al., 2014). Consistently, higher levels of stress and lower levels of happiness have also been showed to be present after SM use (Brooks, 2015), and there seems to be a positive relationship between time spent online and emotional distress (Thorisdottir et al., 2019). However, the relationship between SM and

depressive symptoms may be mediated by networking frequency and not time (Shensa et al., 2017). This relationship might reflect different natures of SM time and frequency with the first one being more under self-control and planed; meanwhile frequency may capture a more compulsive behavior. However, a meta-analysis failed to find a difference on depressive symptoms between time and frequency online (Yoon et al., 2019).

Nevertheless, several studies place great importance on how time spent in SM might influence subjective life satisfaction and affect on its users. Findings in the study of Fioravanti and colleagues (2019) showed that female users who had a social comparison orientation and who went abstinent from Instagram for one week had higher levels of life satisfaction and positive affect. Other experimental study demonstrated that going Facebook abstinent for one week increased subjective life satisfaction, particularly in medium to heavy users (time spent) and users who experienced medium to high envy of others while on the network (Tromholt, 2016). Likewise, more time in SM was associated with a higher risk of self-harm, lower levels of self-esteem and a higher number of depressive symptoms (Barthorpe et al., 2020). Higher levels of anxiety and an increased likelihood of having a probable anxiety disorder in adults have also been reported (Vannucci et al., 2017). However, researchers suggest that other variables might be a better predictor of maladaptive behaviors and emotional distress, such as peer relationship problems (Brunborg & Andreas, 2019) and time spent social comparing on SM (Yoon et al., 2019). As such, it could be hypothesized that a proper characterization of SM dependence should be focusing on how the individual uses SM, rather than on how much.

Changes in academic performance is also one of the areas that has been explored as negatively related to SM overuse (Hou et al., 2019; Vashishtha et al., 2017). Moreover, there is research that shows that SMA symptoms are associated with increased cognitive failures (failure in memory, attention, perception, and motor functioning, in which the action does not match the intention), even when sleep quality is controlled (Xanidis & Brignell, 2016). Minor cognitive failures have been previously seen in both substance disorders (Azaraeen & Memarian, 2015) and behavioral addictions (Albein-Urios et al., 2012; Hadlington, 2015).

Cognitive impairments often seen in substance and behavioral addictions, such as difficulties in inhibitory control and cognitive flexibility, have been also linked to SMA symptoms. While inhibitory control refers to the ability to control our behavior, cognitive

flexibility is associated with the ability to adapt to fluctuating situational demands, to reconfigure mental resources, to deal with competing desires and to change perspective (Kashdan, 2010). Aydın and colleagues (2020) found that in the Wisconsin Card Sorting Test (WCST), an instrument sought to measure executive functions, individuals with a problematic use of SM presented less "categories achieved" and more "perseverative errors". These variables seem to be associated with cognitive flexibility and inhibitory control respectively. Moreover, in the same study, it was found that the "relapse" component of SMA was negatively associated with "categories achieved" and positively with "perseverative errors" only in the group with a SMA. A more impulsive behavior was also seen in a study of Meshi and investigators (2019) who found that participants who had higher levels of Facebook Addiction had a worst performance in the last 20 trials of Iowa Gambling Task, an instrument sought to measure decision making and planning ability. The last 60 trials of Iowa Gambling Task are categorized as a decision making under risk. Similarly, Delaney and colleagues (2017) showed that individuals with moderate to high levels of Facebook Addiction had greater difficulties in delaying larger rewards, having, instead, a preference for smaller and short-term rewards – a phenomenon called delay discounting. Moreover, Zhou and colleagues (2012) found that the IGA group had longer reaction times when neutral stimuli were the target, in comparison to gaming related stimuli, meaning they had a more impulsive behavior towards gaming related cues, and that the slowing effect was bigger in the shifting condition (where mental flexibility was required). Nonetheless, other studies do fail to find differences on response inhibition and cognitive flexibility on people who are at-risk and at no-risk to develop pathological gambling (Odlaug et al., 2011), suggesting a bidirectional relationship between addiction and cognitive impairment.

Predisposing and Maintenance Factors of Social Media Addiction

It seems evident the existence of certain risk factors that mediate the relationship between frequent SM use and negative outcomes, such as personality traits. Neurotic individuals seem to be more prone to spend greater time online, most likely for improving mood and coping with negative affect or escaping from real-life problems (Marino et al., 2016), thus contributing to the risk of developing a SMA (Cheak et al., 2012). Low levels of conscientiousness have also been reported as associated to SMA (Sindermann et al., 2020). While greater levels of neuroticism are associated to negative affection (e.g., anxiety, hostility, depression, self-conscious, irritability, impulsivity, vulnerability) high

levels of conscientiousness are associated to self-regulation, self-discipline, organization and perseverance. Users who are more conscious might be less involved in SMA since SM require self-regulation abilities (e.g., when a notification pops up), therefore decreasing the likelihood of having daily activities disrupted from interruptive notifications (Sindermann et al., 2020). More inconsistent results have been found relating Extraversion, Agreeableness and Openness, the other domains of personality (Biolcati et a., 2018; Özgüven & Mucan, 2013; Sheldon et al., 2020).

Furthermore, Brand and investigators (2016) proposed a theoretical model – The Interaction of Person-Affect-Cognition-Execution (I-PACE) Model - that summarizes the overall predisposing factors and moderator variables on the development and maintenance of specific Internet-use disorders such as SMA: Predisposing variables (biopsychological constitution, psychopathological features, personality and social cognitions and specific motivations of using internet); affective and cognitive responses to internal or external stimuli (cue reactivity, craving, urge for mood regulation, attentional bias and approach tendencies, coping strategies and internet-related cognitive biases); executive and inhibitory control and decision-making behavior (having both an effect on development and maintenance of SMA); and consequences of using SM (such as gratification or compensation). If positive outcomes occur from SM use, then behavior, predisposing variables as well as affective, cognitive and executive factors are reinforced, therefore increasing the likelihood of using SM excessively.

Consistent with the I-PACE model, Wegmann and colleagues (2018) showed that psychopathological symptoms are an important variable in the development and maintenance of SMA, and that cognitive and affective components, such as avoidance expectancies and cue-induced craving, respectively, act as mediators. Boredom proneness was also associated with SMA, with avoidance expectancies and cue-induced craving being mediators too. Former studies also suggested that emotional distress and individual characteristics such as self-esteem, self-efficacy and stress vulnerability are important predictors of an excessive use of SM, with Internet-use expectancies (expectations towards SM use) and dysfunctional coping strategies being moderators (Wegmann & Brand, 2016). This is to be expected since individuals under these circumstances may have a higher need for mood regulation (Wegmann & Brand, 2016).

Study Purpose and Hypothesis

Although a relationship between excessive use of SM and negative outcomes is apparent, there are only a few studies that use implicit experiments to probe this matter, which means that the findings can be biased to a certain extent. In function of the digital growth, with individuals spending more time social networking each year, there is a need to better understand the relationship between SMA symptoms and cognitive impairments, especially when there is literature reporting similarities between SMA and other behavioral addictions. In this way, it was sought to further understand the relationship between the Level of Addiction (LoA) to SM and inhibitory control and cognitive flexibility impairment, using a modified Go/No-Go task. LoA was assessed by the Addiction to Social Media Scale (ASMS) (Al-Menayes, 2015; Portuguese version by Lira, 2016). The Go/No-Go Task is often used in a modified version to study the association between certain executive functions and addiction disorders (Turel et al., 2014; van Holst et al., 2012;). Its purpose is to assess the ability to inhibit a motor response after it has been previously established (American Psychological Association [APA], n/d), and it involves a decision process, where the individual must select between the execution or inhibition of a motor response. When the target-stimuli (Go) is presented there must be a response by the individual, but the response must be inhibited in the presence of a distractor (No-Go). The Go-stimuli often used in the study of addiction disorder is related to the addiction due to their emotional value (see Turel et al., 2014; Zhou et al., 2012 for examples). Here, emotional stimuli were SM-related, and Traffic Signs (TS) were the neutral stimuli. Shifting conditions are often used in this paradigm, as a mean of measuring cognitive flexibility. As such, in the present study, the Go-Stimuli could be SM-related or TS (Appendix A), depending on the experimental condition. The order in which conditions were presented was randomized (SM/TS or TS/SM). To assess inhibitory control and cognitive flexibility, measurements of hit and false alarm rate, sensitivity index (*d'*), decisional bias (C) and reaction time (RT) were made. RT analysis included RT to Go Stimuli (correct responses) and to No-Go Stimuli (wrong responses). C served as an index of inhibitory control and RT as an index for habitual-impulsive response (Turel et al., 2014).

Since the primary population spending a greater time in SM are young adults between the ages of 18-34, college students were targeted for participation in this project. A better understanding of the relationship between SMA and certain executive functions

may bring awareness to college students regarding the negative correlates associated with SM use, and thus motivate a further control on SM behavior.

Past research suggests certain personality traits as possible predisposing factors of SMA, as well as depressive and anxious symptomology and tendency to engage in social comparison, so these variables were taken into consideration. Furthermore, sleep problems were sought to be controlled because of their relationship with SM use and cognitive failures (Xanidis & Brignell, 2016).

The purpose of the present study was to examine differences between groups with different severity of SMA in inhibitory control and cognitive flexibility, in a Go/No-Go task with a shifting and a non-shifting component. It was expected that the group with higher levels of SMA (here named the "addicted group", for differentiating purposes) would present a higher decision bias and a lower RT to SM Stimuli in both Go-Conditions. Both are indicative of a lower inhibitory control and a higher impulsivity, and these effects have been identified before in addiction disorders (see Delaney et al., 2017; Turel et al., 2014; Zhou et al., 2012). Specifically regarding SM Go-Condition, it was expected that the addicted group would show a higher hit-rate and *d'*, but in TS Go-Condition, a higher false alarm rate and a lower *d'*. As addictive behaviors progress, addiction related-stimuli become more salient, thus resulting in a higher ability to discriminate these stimuli from other unrelated ones, but also a higher difficulty in inhibiting a response towards them (see Turel et al., 2014; Zhou et al., 2012 for examples). Finally, regarding the shifting conditions, it is expected that in order "SM Go/TS Go" the addicted group will present a higher false alarm rate and a lower *d'*, since it requires the inhibition of a response to SM-stimuli after it has been previously established, and due to hypothesized difficulties in inhibitory control.

Method

The experience had a 2x3x2x2 factorial design. Independent variables included the order of the Go/No Go Task Conditions (SM/TS;TS/SM) and level of SMA (no-risk, at-risk and addicted), both between-subjects, and the type of Go-Conditions displayed (SM or TS-Go) and type of stimuli (Go and No-Go), both within subjects. Dependent variables were the parameters related to the Go/No-Go Task described above and scores

in questionnaires regarding sleep quality, personality, depressive and anxious symptomology and social comparison orientation, posteriorly described in the text.

Participants

The present study included a convenience sample of fifty-five university students, 35 woman (63.6%) and 20 man (36.4%), with ages between 18-31 (M = 21.18; SD = 2.29). Recruitment was carried through SM platforms (e.g., Instagram, Facebook) and institutional e-mails. An informed consent was first introduced so participants would be aware of the purpose of the study, confidentiality of the gathered information and the volunteer nature of their participation (Appendix B). Exclusion criteria included the presence of any psychiatric condition or uncorrected visual problems, not being a college student, not knowing how to read or understand the Portuguese language, and ages below 18 years old or above 35. The present study was developed in accordance to the General Data Protection Regulations (GDPR) and its National Enforcement Law and was approved by the Ethics Committee (EDC) from the University of Aveiro.

Three groups (no-risk, at-risk and addicted group) were created based on the distribution of ASMS obtained scores. The no-risk group only gathered individuals with scores below the first quartile, the at-risk group involved only subjects with scores between the first and third quartile, and the addicted group involved only participants with scores above the third quartile. The division of the sample by quartiles was purposefully chosen so more distinct groups would be obtained. As such, cut-off points were 30 points (Q1), 34 (Q2) and 40 (Q3). The no-risk group consisted of 14 students (25.5%) (Md = 25.00; SD = 3.30), the at-risk group consisted of 30 students (54.5%) (Md = 34.0 SD = 3.18), and the addicted group consisted of 11 students (20%) (Md = 43.00; SD = 3.09).

Materials

The Go/No-Go Task included forty visual stimuli (twenty SM-related and twenty TS). SM-related stimuli included images regarding SM platforms logotypes, main tools and notification symbols (for an example see Appendix A), due to possibly being the characteristics most well and implicitly recognized by SM users. TS stimuli, which were similar to SM logos in terms of visual complexity, colors and shape, were purposefully chosen. Pictures were taken from the Internet and were transformed into a fixed dimension of 650x400 pixels.

The experimental task was programmed using Psychopy (version 1.9.6) and implemented online with Pavlovia.org.

Measures

Addiction to Social Media Scale (ASMS) (Al-Menayes, 2015; Portuguese version by Lira, 2016). ASMS measures symptoms surrounding addiction to SM through two factors: "Compulsive Feelings", related with boredom and the need to use SM; and "Social Consequences", including deterioration of school performance and driving, not meeting with friends and thinking about SM when not using them (Lira, 2016). In total there are 14 items, with a five-point Likert scale ranging between 1 (Totally Disagree) and 5 (Totally Agree) (Lira, 2016). The total score is obtained by the sum of the participant rating of each item, which then can range between 14 and 70 points. Higher scores indicate a heightened risk of developing a SMA. A reasonable Cronbach alpha ($\alpha > .70$) was encountered in both factors (Lira, 2016).

Basic Scale on Insomnia and Quality of Sleep (BaSIQS) (Gomes et al., 2015). BaSIQS is an instrument that measures sleep onset and maintenance problems, subjective quality and depth of sleep in the last month (Gomes et al., 2015). It uses a 5-point Likert scale from 0-4, except for the last two items, which are reversed. Total score is obtained by summing the individual ratings of each item, with higher scores meaning a poorer sleep. BaSIQS has good psychometric qualities, such as internal consistency ($0.7 < \alpha < 0.8$), temporal stability (with a test-retest correlation coefficient of approximately .90); construct validity (sensitivity = .69; specificity = .77)*;* and concurrent validity ($r = .65$ between BaSIQS and Pittsburgh Sleep Quality Index) (Gomes et al., 2015).

Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983; Portuguese adaptation by Pais-Ribeiro, Silva, Ferreira, Martins & Baltar, 2007). HADS is a 14-item scale originally developed to identify and measure symptomology associated with anxiety and depression in a hospital context, but that currently is used in a much broadly way (Pais-Ribeiro et al., 2017). In its Portuguese version, HADS is divided in two scales: "Depression" and "Anxiety" (Pais-Ribeiro et al., 2007). It uses a 4-point Likert-scale, whereby the participant must answer from "Not at all" (0 points) to "Most of the Time (3 points) how frequent a specific symptom was experienced in the past week. As such, 21 points is the highest score a individual can get in each scale, with a result of 11 points being an indicator of depressive or/and anxiety symptomology (Pais-Ribeiro et al., 2007).

Internal consistency (α anxiety = .76 α depression = .81), temporal stability, factorial validity and sensibility are good psychometric qualities found (Pais-Ribeiro et al., 2007).

Social Comparison Orientation Scale (INCOM) (Gibbons & Buunk, 1999; Portuguese adaptation by Lins, Campos, Leite, Carvalho, Cardoso & Natividade, 2016). INCOM aims to measure individual differences in tendency to social comparison. It includes two dimensions: "Opinions" related to the act of comparing feelings and thoughts, and "Aptitudes", concerned with the comparison of abilities (Lins et al., 2016). Participants can choose between 7 options of response with 1 ("Totally Disagree") equaling 1 point, 4 ("Indifferent") equaling 4 points and 7 ("Totally Agree"), equaling 7 points (Lins et al., 2016). Score is obtained through the sum of points of each item. In its Portuguese adaptation, both dimensions of INCOM have good Cronbach coefficients (a > .70).

NEO-FFI– 20: Personality Inventory (Bertoquini & Pais Ribeiro, 2006). There are five main domains of personality measured by only 20 items: Neuroticism, Extroversion, Openness, Agreeableness and Conscientiousness (Bertoquini & Pais Ribeiro, 2016). The items are scored on a five-point Likert Scale (from 1 = "Strongly Disagree" associated with zero points and "Strongly Agree" with five points. The total score, which is thought to measure the degree of each domain the participant has, is obtained through the sum of the items score in each domain. For psychometric qualities, it is worth mentioning both convergent (.68 < *r* < .77 between NEO-FFI 20 and NEO-PI-R) and discriminative validity; concurrent validity (similar correlations as NEO-PIR-R and NEO-FFI for negative and positive affect, life satisfaction, and subjective well-being and happiness); and internal consistency (0.70 < a < 0.76) (Bertoquini & Pais-Ribeiro, 2006).

Procedure

Data collection was organized in two stages. The first phase included the administration of all the measures. Participants had to answer to a Socio-Demographic Questionnaire (Appendix C), ASMS (Appendix D), BaSIQS (Appendix E), INCOM (Appendix F) HADS (Appendix G) and NEO-FFI-20 (Appendix H) using the online platform FormsUA. The second phase focused on the implementation of the Go/No-Go task. At the end of the first phase, a link directing to the online platform "Pavlovia" was displayed, so that subjects could perform the experimental task. In the initial information about the study, participants were instructed to answer the questionnaires and to perform the experiment in a room with no distractions.

Prior to beginning of the experimental task, participants were informed that there would be three phases: a practice phase, with twenty trials; a SM Go phase, where participants were instructed to press the "space" key when SM related-stimuli appeared on the screen, and ignore TS; and a TS Go phase, where they were instructed to press "space" when TS were perceived and ignore SM related cues. Before any experimental condition, a practice phase was introduced. The order in which the Go-Conditions were presented was randomized, to control possible effects of order. Thirty-one participants completed first the SM Go Condition, and twenty-four participants started the experiment with the TS Go Condition. Subjects were instructed to make their responses as quickly and accurately as possible. Instructions were all displayed on the screen. The task included two blocks of each Go-Condition, each one with 80 Go trials (80%) and 20 No-Go trials (20%), to increase the tendency to respond. Each block was repeated once, totaling 200 trials in each Go-Condition. Participants were invited to take a short break between blocks, being suggested a maximum of a one-minute interval. Each picture, presented for 500ms, was preceded by a fixation cross during 1000ms. In the practice phase, there were 16 Go and 4 No-Go trials. Feedback was given only in the practice trials: the "correct" word was used when the response was correct, the word "wrong" when the response was incorrect, and the sentence "Ups! You must be faster!" appeared on the screen if an answer to Go-stimuli was made after the 500ms of stimuli display. For an illustrative scheme of the trial sequence, see Appendix I.

Statistical Analyses

For statistical analyses, Statistical Package for Social Sciences (SPSS) from IBM Statistics (version 25.0.0.2) and Excel Microsoft were used. A signal detection analysis was performed to determine hit[1] and false alarm rate[2], *d'* [3]and C [4]in both Go-Conditions (Turel et al., 2014). The statistical level of significance was set at $p < .05$ for all analyses.

Non-parametric tests were performed due to small and unbalanced subsamples. The Kruskal-Wallis test was used to explore differences between LoA in the different Go-Conditions, and in the different Order of Conditions. To explore differences between specific groups of LoA, Mann-Whitney tests were also performed. Regarding differences between Order of Conditions and Go-Conditions, t-tests for independent and paired

[1] Hit Rate = #Hit / (#Hit+ #Miss)
[2] False Alarm Rate = #False Alarm / (#False Alarm+ #Correct Rejections)
[3] *d*' = z(Hits)-z(False Alarms)
[4] C = -0.5x[z(Hit Rate)+z(False Alarm rate)]

samples were performed if the normality of distributions were verified. If not, Mann-Whitney and Wilcoxon tests were, respectively, performed. Cognitive biases and inhibitory control were inferred from the LoA x Go-Conditions, while shifting abilities were inferred from the LoA x Order of Conditions. Furthermore, to explore the relationship between ASMS score and biopsychosocial constructs, both Pearson's and Spearman's correlations were performed, depending on if the normality of the distributions was verified or not.

Results

Go/No-Go Task. Descriptive statistics are displayed in Appendix J, K and L.

RT. Significant differences were found in RT to SM Go-Stimuli between LoA, $X^2(2,55) = 7.79$, $p = .020$**.** The no-risk group displayed a lower RT than the at-risk (U = 131.00, z = -1.99, $p = .047$) and the addicted groups (U = 24.00, z = -2.90, $p = .001$) ($Md_{norisk} = .304$; SD =.023, $Md_{atrisk} = .328$; SD = .026, $Md_{addicted} = .332$; SD = .011) (see Figure 1). No significant differences between LoA in order TS/SM regarding RT to SM Go-Stimuli were found, $X^2(2,24) = 3.99$, $p = .136$, but isolated analysis showed that in this order, the addicted group was significantly slower reacting to SM stimuli than the no-risk ($Md_{addicted} = .331$; SD = .018, $Md_{no\text{-}risk} = .300$; SD = .026) (see Figure 2), U = 2.00, z = -2.04, $p = .048$. RT to TF No-Go Stimuli was also significantly different between groups, $X^2(2,55) = 6.60$, $p = .037$. The no-risk was significantly faster than the at-risk (U = 127.00, z = -2.09, $p = .037$) and addicted groups (U = 31.00, z = -2.52, $p = .011$) ($M_{norisk} = .280$; SD = .025, $M_{atrisk} = .300$; SD = .030, $M_{addicted} = .306$; SD = .023) (see Figure 1). Although no significant differences between LoA in order TS/SM were found regarding RT to TF No-Go Stimuli, $X^2(2,24) = 5.37$, p = .068, isolated analysis showed that the addicted group was significantly slower than the no risk group to TF No-Go stimuli ($Md_{norisk} = .281$; SD = .028, $Md_{addicted} = .330$; SD = .015) (Figure 3), U = 1.00, z = -2.25, $p = .024$.

Hit Rate. No significant differences were found between LoA in both SM Go-Condition, X^2 (2,55) = 1.25, $p = .534$, and TS Go-Condition, X^2 (2,55) = 1.25, $p = .535$. Similarly, hit rate differences were not significant between LoA in order SM/TS, $X^2(2,31) = 1.47$, $p = .480$ and order TS/SM, $X^2(2,24) = 1.11$, $p = .575$ in SM Go-Condition and TS-Go Condition, $X^2(2,31) = 1.38$, $p = .501$ and $X^2(2,24) = 1.20$, $p = .905$.

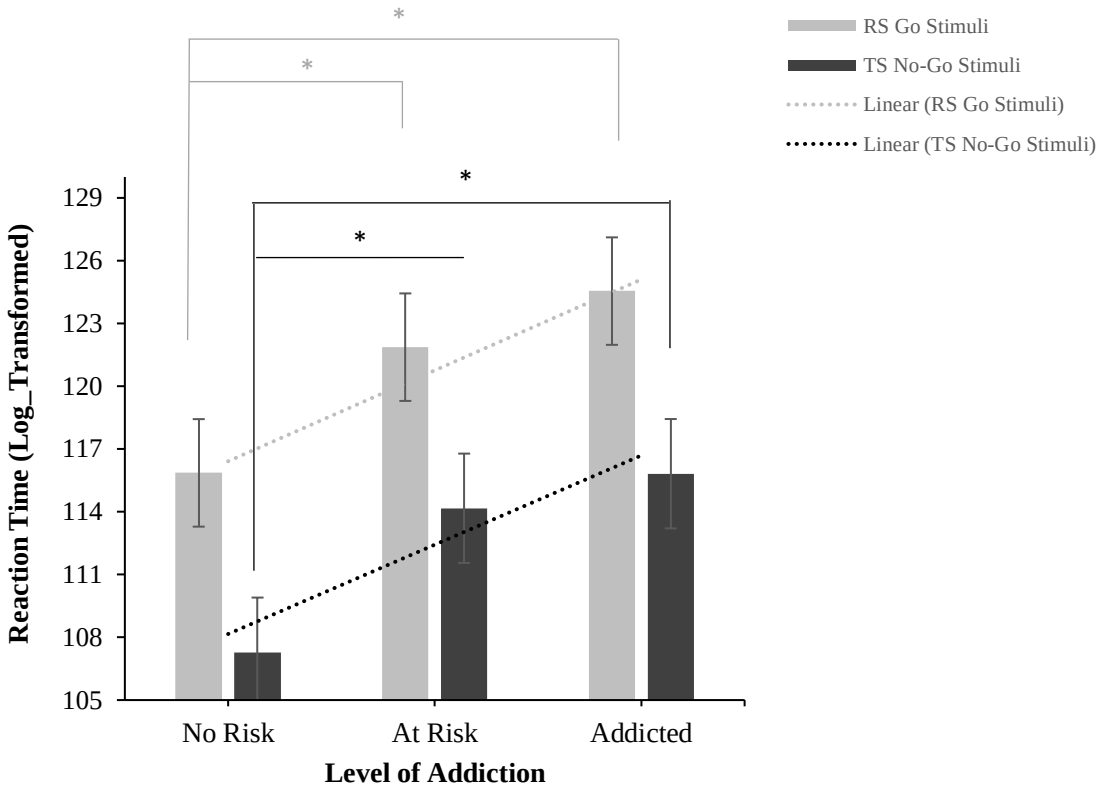


Figure 1. Mean Reaction Time in SM-Go stimuli and TS No-Go stimuli per LoA. Note. Error bars represent the standard error of the means; * $p < .05$.

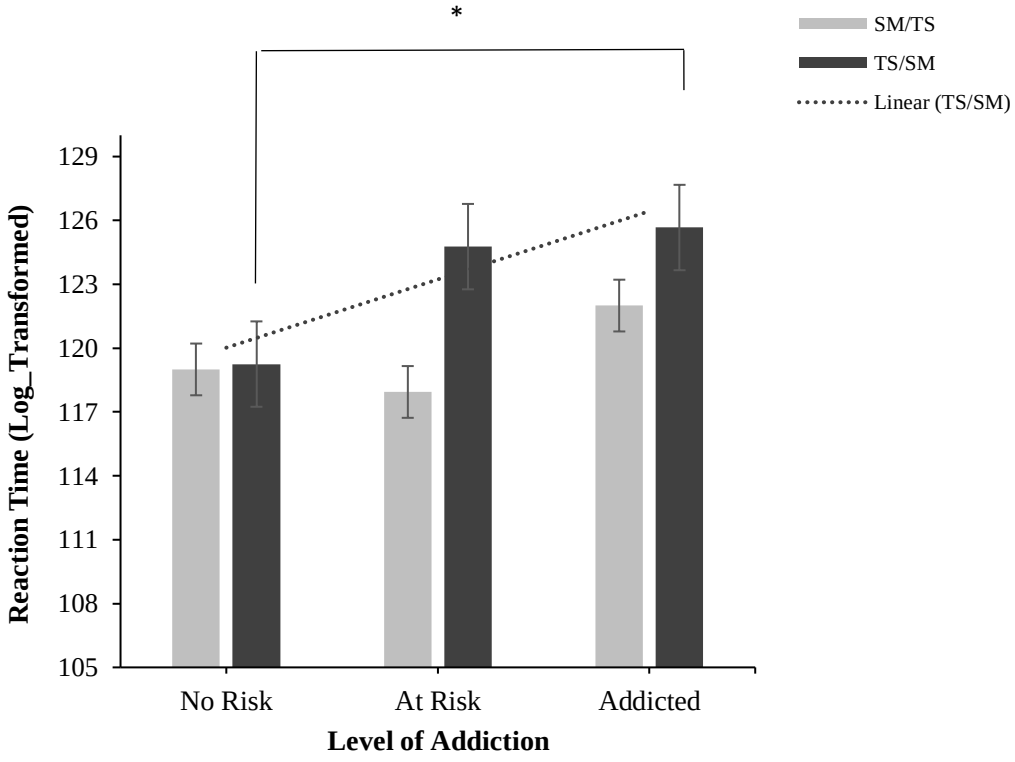


Figure 2. Mean Reaction Time in SM Go Stimuli in Order SM/TS and Order TS/SM per LoA. Note. Error bars represent the standard error of the means; * $p < .05$.

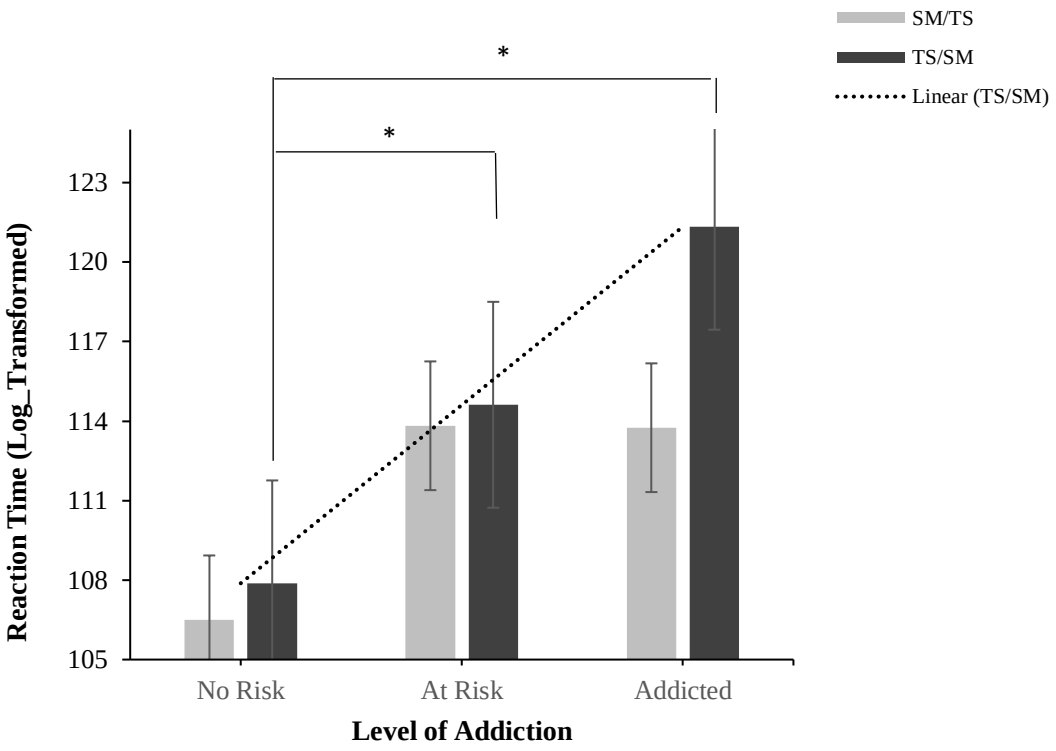


Figure 3. Mean Reaction Time in TS No-Go Stimuli in Order SM/TS and Order TS/SM per LoA. Note. Error bars represent the standard error of the means; * $p < .05$.

False Alarm Rate Go-Conditions. Significant differences were found in false alarm rate in SM Go-Condition between LoA, X^2 (2,55) = 6.80, p = .033. The no-risk group had a significantly higher false alarm rate than the addicted group (Md_{norisk} = .108; SD = .029, $Md_{addicted}$ = .065; SD = .028) (U = 30.50, z = -2.55, p = .009) (Figure 4).

***d'* Go-Conditions.** *d'* was not significantly different between LoA in SM Go-Condition, X^2 (2,55) = 5.75, p = .057. However, isolated analysis showed that the at-risk group had a significantly lower *d'* (Md = 1.931; SD = .293) than the addicted group (Md = 2.063; SD =.268) (U = 106.00, z = -1.74, p = .043), and so it did the no-risk group (Md = 1.875; SD = .213) (U = 31.50 z = -2.49, p = .006) (Figure 5). Furthermore, significant differences were found between LoA in order SM/TS in SM Go-Condition, X^2 (2,31) = 6.01, p = .049. Under these circumstances, the at-risk group significantly differed from the addicted group, (U = 29.00, z = -2.37, p = .023), (Md_{atrisk} = 1.954; SD = .315, $Md_{addicted}$ = 2.089; SD = .204) (Figure 6).

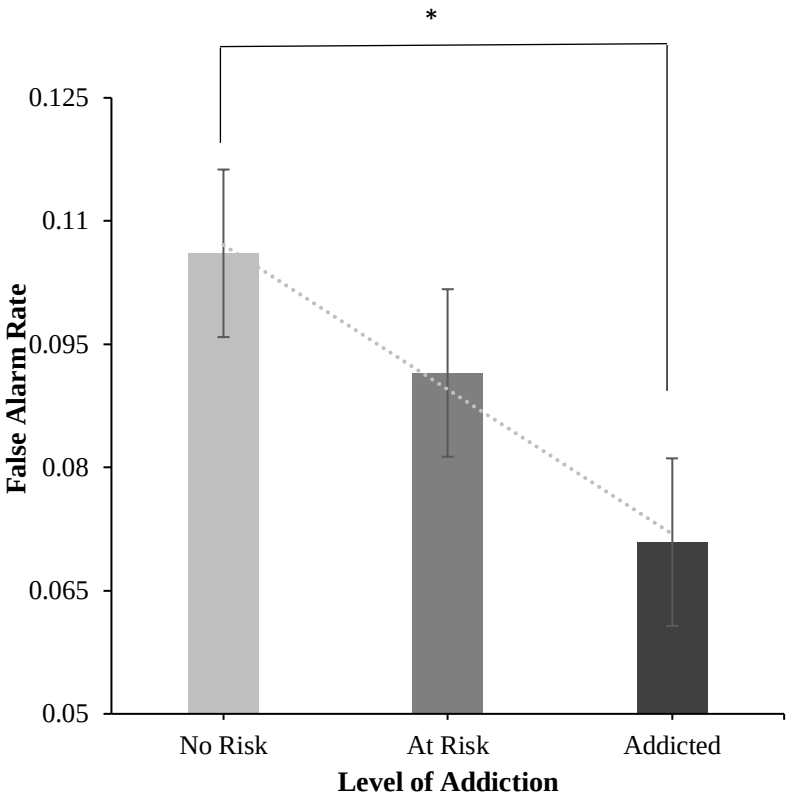


Figure 4. Mean False Alarm rate in SM Go-Condition per LoA. Note. Error bars represent the standard error of the means; * $p <$ .05.

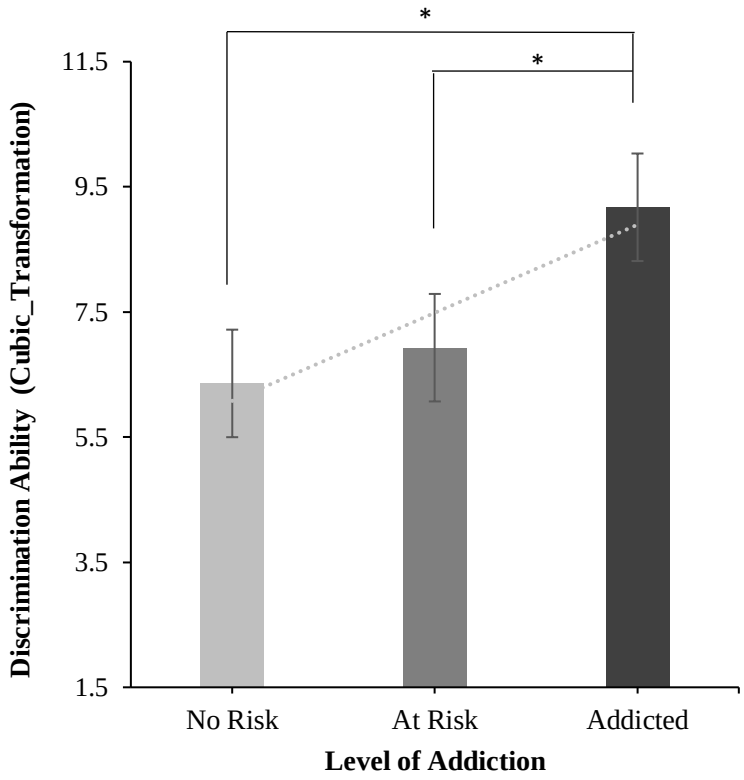


Figure 5. Mean Discrimination Ability in SM Go-Condition per LoA. Note. Error bars represent the standard error of the means; * p <. 05

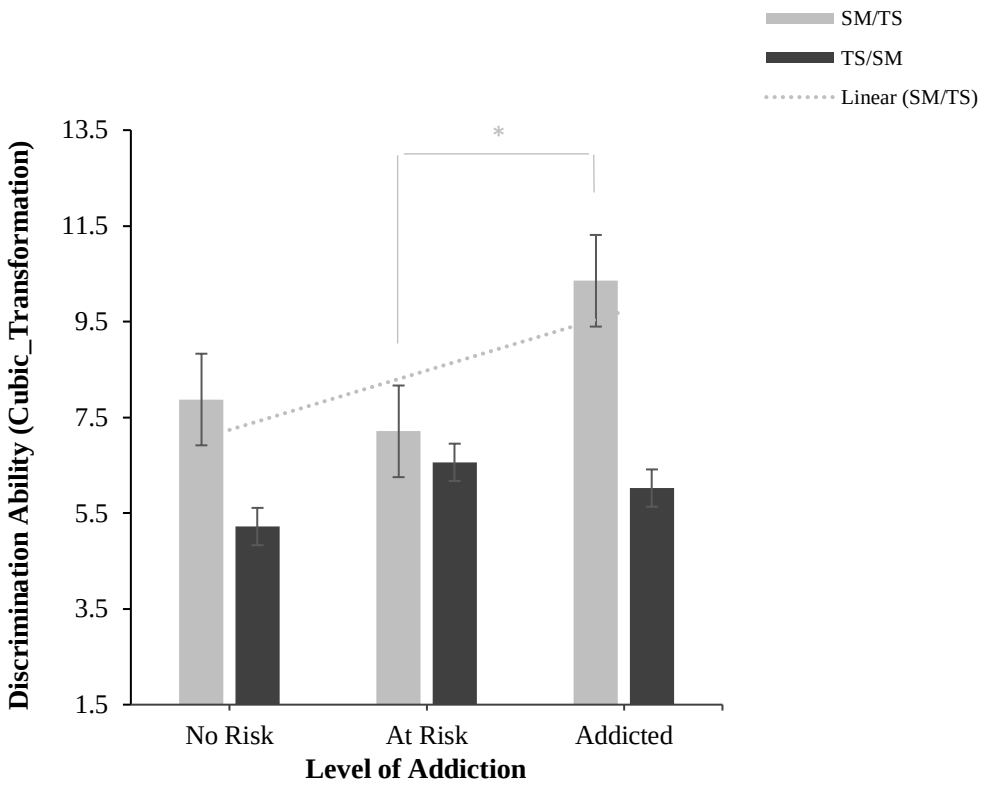


Figure 6. Mean Discrimination Ability in SM Go-Condition in Order SM/TS and Order TS/SM per LoA. Note. Error bars represent the standard error of the means; * p < .05.

C Go-Conditions. In SM Go-Condition, C was significantly different between LoA, $X^2(2,55) = 6.29$, $p = .043$. The addicted group (Md = .469, SD = .101) had a significantly higher C than the no-risk group (Md = .348, SD = .108), U = 32.50, z = -2.44, $p = .007$ (Figure 7).

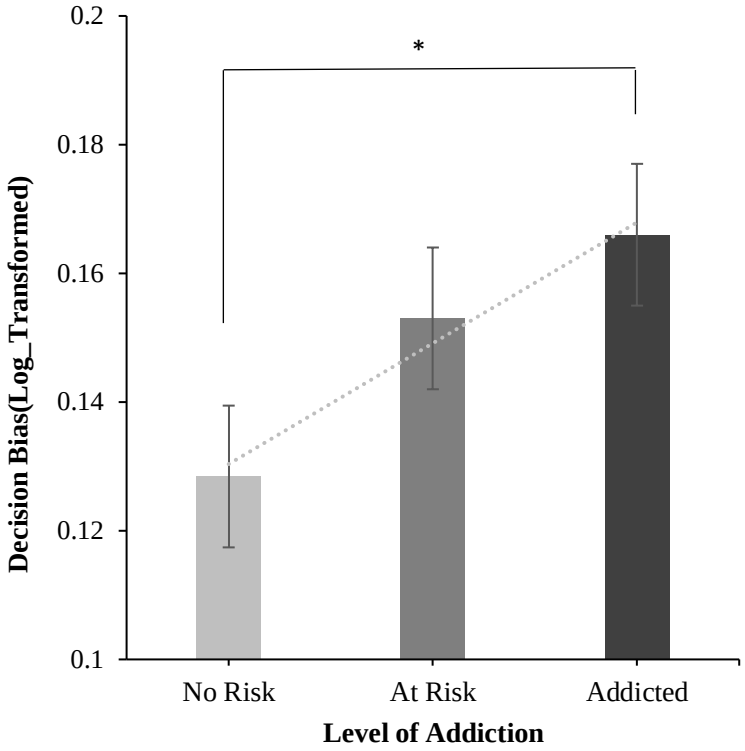


Figure 7. Mean Decision Bias in SM-Go Condition per LoA. Note. Error bars represent the standard error of the means; * $p < .05$.

Correlation Analyses

Correlation analyses are presented in Appendix M. Results showed a significant positive correlation between ASMS and Neuroticism ($r_s = .607$, $p < .001$) and a negative correlation with Conscientiousness score ($r = -.332$, $p = .013$). ASMS also positively correlated with Depression subscale score ($r_s = .385$, $p = .004$) and Aptitudes' subscale score ($r_s = .338$, $p = .012$). In the latter correlations, when Neuroticism score was controlled, the correlations stopped being significant, ($r_s = .073$, $p = .601$; $r_s = .079$, $p = .570$, respectively). Regarding the experimental paradigm, positive correlations were found between ASMS score and RTs in SM Go-Condition, for both Go ($r = .394$, $p = .003$) and No-Go stimuli ($r = .352$, $p = .008$), and false alarm rate ($r = -.296$, $p = .028$) and C in the SM Go-Condition ($r = .270$, $p = .046$). Again, when Neuroticism score was controlled, the relationship between false alarm rate in SM Go-Condition and ASMS was no longer maintained ($r = -.216$, $p = .116$).

It was also found that, among ASMS subscales', only the Social Consequences subscale score correlated significantly with C (r_s = .344, p = .010) and False Alarm Rate in SM Go-Condition (r_s = -.374, p = .005). Among ASMS total score and its subscales scores, Social Consequences was also the only one who correlated significantly with RT in TS Go-Condition in Go stimuli (r_s = .328, p = .015) and *d'* in SM Go-Condition (r_s = .286, p = .034). However, when controlling for Conscientiousness score the correlation between Social Consequences score and RT in TS Go-Condition in Go stimuli was no longer significant (r_s = .195, p = .157). Similarly, between both ASMS subscales', only the Compulsive Feelings subscale positively correlated with Depression score (r_s = .269, p = .047), and between ASMS total score and its subscales, only the Compulsive Feelings score correlated significantly with BaSIQS score (r_s = .296, p = .047).

Other correlation analysis showed an overall significant negative correlation between false alarm rate in SM Go-Condition and RT in Go-stimuli, r = -.503, p <.001. However, analysing separately each group, it was found that this relationship was significant only in the no-risk group (r = -.685, p= .007), but not in the at risk (r = .050, p = .794) and addicted groups (r = -.163, p = .632).

Discussion

The goal of the study was the evaluation of cognitive deficits among individuals with SMA related symptoms, namely cognitive flexibility and inhibitory control.

Some of our findings lend some support on considering SMA as a proper addiction, namely results regarding attention bias to reward-related cues, whose concept is here understood as a tendency to allocate and maintain automatically increased attention to addiction related cues (van Holst et al., 2012). We found a bias in the at-risk and addicted groups in RT to SM Go-stimuli, in comparison to the no-risk group. These findings support the idea that individuals with behavioural addiction symptoms have a tougher time disengaging attention from addiction related cues (Heuer et al., 2020). Heuer and colleagues (2020) showed a similar difficulty "turning" off the attention in individuals with IGA to gaming-related stimuli in comparison to neutral cues (e.g., sports), as they had a higher RT and larger Post-Selecting Processing amplitudes, a marker associated with the continuation of the attention processing. Thus, in future would be interesting to examine the association between RT and amplitudes of event-related potentials related

with attention disengaging in SMA to test for the previous hypothesis. A higher difficulty disengaging from SM cues may be a result from the Reward Based-Learning Process and the compulsive feelings SM elicits (e.g., salience to SM cues) (Thompson et al., 2021). Through repetitive exposure to rewards of SM use, the association between SM stimuli (e.g., sound of the notifications) and rewards (e.g., an interaction with our post) is strengthened. As such, when addiction-related stimuli are perceived, the individual is likely more reactive towards them. Additionally, an increased response latency in addicted related stimuli may be carried over to unrelated addiction cues as a carry-over effect (Hønsi et al., 2013), a phenomenon that was also found in this study in the at-risk and addicted group, as seen by a slower RT to No-Go stimuli in SM Go-Condition.

Interestingly, however, our results suggest that, when another task is required to be done and paid attention to, individuals with low-medium SMA symptoms do not show an attention bias towards SM cues, as seen by no differences found between LoA in RT SM No-Go stimuli. Indeed, only when social impairment was higher (as seen in Social Consequences subscale score), a higher RT to TF Go Stimuli was present. Although no literature is found regarding a similar effect and our analysis are only correlational in nature, these findings may suggest a higher difficulty in individuals with a more impaired SMA symptoms in disengaging attention from SM-stimuli when they are restricted to form a response towards them, not necessarily shown by a higher time processing SM related cues, but for a continued increased response latency towards non-related addiction stimuli.

As an indicator of attentional bias, it was also found a higher discrimination ability and a lower false alarm rate and disinhibition in the addicted group, but only in SM Go-Condition. These results are in line with previous research. Zhou and others (2012) found that hit-rate and *d'* in the IGA group was only higher when the target was gaming-related, similarly to Decker and Gay (2011) study. Van Holst and colleagues (2012) also found that problem gamblers made less impulsive errors when the Go-target was gambling-related. Finally, Turel and colleagues (2014) found that, even though differences were not significant, Facebook addicts had a higher C towards Facebook stimuli than in TS-stimuli. Furthermore, even though C values in the present study went in a different direction, Decker and Gay (2011) and Zhou and investigators (2012) found a higher disinhibition in individuals with IGA, but only towards gaming-related cues, revealing once again an attention bias towards addiction related stimuli.

Difficulties shifting attention were also seen in individuals with low-medium SMA symptoms in the present study, but only among those who were asked first to supress their response to SM cues. Under these circumstances, only the addicted group required a higher time processing SM-Go stimuli in the shifting condition (SM-Go Condition). Thus, only when they are first restricted to answer to SM cues, individuals with low-medium SMA symptoms might have difficulties disengaging attention from SM related-stimuli, perhaps due to resulted subjective craving, an hypothesis further discussed in the text. Indeed, negative feelings such as irritability, difficulties concentrating and craving have been associated to psychological outcomes of a SMA (Wegmann et al., 2018). Although no literature was found regarding the occurrence of a similar phenomenon, it could be that the addicted group who performed the Go/No-Go task with the order TS/SM, because it was first restricted to, desired the most the SM use, thus being more reactive towards SM targets. Future studies could seek the evaluation of subjective craving pre and post each Go-Condition to assess this hypothesis. Zhou and colleagues (2012) showed a similar difficulty in cognitive flexibility among individuals with IGA in the shifting condition, but when the Go-stimuli were neutral images and the No-Go stimuli, the gaming related ones. The group with IGA had a more pronounced higher Go-RT than the control group in comparison to the non-shifting condition. Our findings suggest that both attentional bias and deficits in cognitive flexibility in individuals with low-medium SMA symptoms may just be perceived when users are first restricted to use SM.

Although an attentional bias towards addiction-related cues was indeed found in the addicted group, some of our findings do not support the existence of inhibitory control deficits in individuals with low-medium SMA symptoms. For example, no differences between LoA were found in false alarm in TS Go-Condition, even when considering the shifting conditions. Moreover, we did not find that the shifting condition in order SM/TS resulted in a worse performance in the addicted group. Similarly, Zhou and colleagues (2012) failed to find significant differences between gaming addicts and the control group in non-shifting (Gaming stimuli Go) and shifting (Neutral stimuli Go) conditions in *d'*. Decker and Gay (2011) found a similar result in IGA group, where a shift in Target (World of Warcraft words Go and English words No Go) did not produce significant differences in *d'*. It may be that contrary to other behavioural addictions (e.g., pathological gambling), in which perhaps more severe consequences occur (e.g., financial

problems) and in which society does not comply with such behaviours, SMA is socially accepted (Turel at al., 2014). Thus, it may be that individuals with low-medium SMA symptoms just don't have the motivation or interest in controlling the use of SM, instead of having real deficits in inhibitory control. In line with these thoughts, Gao and investigators (2019) also showed no significant differences between excessive and non-excessive SM users in accuracy in Go and No-Go stimuli. However, Zhou and colleagues (2012) revealed that C in both conditions and the overall *d'* was lower in individuals with IGA. Likewise, Moretta and Buodo (2021) found that accuracy was lower in the group with Facebook Problematic Use both in Go and No-Go stimuli. In this sense, the lack of significance found in false alarm rate in TS-Go Condition in the present study could be due to the possibility of both the at-risk and addicted groups having an addiction to a specific SM platform (e.g., Instagram), and the Go/No-Go paradigm here used involved different SM platforms associated stimuli (e.g., Facebook, Twitter, …). It could also be that our sample presents a spectrum of low-medium SMA symptoms, and differences in hit and false alarm rate would only be seen in more severe cases.

Curiously, not only some of our findings do not support the presence of deficits in inhibitory control and cognitive flexibility, but suggest that individuals with low-medium SMA symptoms might have some facility discriminating SM cues (e.g., notifications sounds), and be more cautious regarding their response to SM stimuli. Our addicted group, in SM Go-Condition, had a significantly lower false alarm rate and a higher *d'*, a measure of discrimination ability, where higher values are associated with a better performance (i.e. more hits and less false alarms), and a higher C, an indicator of overall disinhibition, where the lower the C, the higher the readiness to respond to any stimuli, both Go and No-Go. In line with our results is the Incentive Sensitization Theory, which states that an attention bias develops as a mean of repeated exposure to addiction related cues (van Holst et al., 2012). This enhanced attention for addiction related stimuli may result in a negative performance in cognitive tasks, if this bias overloads attentional resources towards affective stimuli (e.g., resulting in more false alarms), or, on the contrary, enhance performance in individuals with addiction symptoms since addiction related-cues became more salient through repeated exposure (van Holst et al., 2012). Thus, our findings are in line with the idea that users can both benefit from the positive effects of SM, as experience the negative effects (Firth et al., 2019).

Moreover, two phenomena regarding *d'* were seen in the present study. One was that an enhanced performance in the addicted group in SM-Go Condition was only present if they performed first in the paradigm allowed to respond to SM cues. We suggest that the absence of this phenomenon in those who were firstly restricted to answer to SM related-stimuli were due to the gain of subjective craving in TS Go-Condition, thus perhaps making more false alarms than those who started the paradigm with order SM/TS. Indeed, there is research that shows that addicts are vulnerable to addiction-related stimuli that trigger reward-processing areas in the brain (see Turel et al., 2014) and display a hypoactivity of areas and a lower amplitude of event-related potentials associated with a the engagement of inhibitory processes to addiction and overall cues (Moretta & Buodo, 2021; van Holst et al., 2012). A more reactive response towards SM targets (as a possible result of subjective craving in using SM) in conjunction with a lower engagement of inhibitory processes overall may explain why the addicted group in order TS-SM did not also thrived in SM Go-Condition, as the addicted group in order SM/TS did. The second phenomenon was the finding that *d'* in SM Go-Condition was only positively correlated to Social Consequences subscale score, suggesting that only among those with low-medium SMA symptom severity who have been previously socially impaired by SM use may better discriminate SM stimuli from unrelated ones. Consistent with the I-PACE Model (Brand et al., 2016), we suggest that this relationship is a result of negative and positive reinforces of SM use and the repeated exposure to SM stimuli. A continued prioritization of SM use (e.g., as a form of anxiety avoidance) in comparison to other tasks (e.g., study), can result in SM related stimuli gaining an emotional meaning (e.g., by diminishing the state of anxiety), then being more easily discriminated from other stimuli. Additionally, compulsive feelings might not be an enough indicator of *d'*, because even among individuals at no-risk of developing SMA, compulsive feelings towards SM may be present due to the continued growth of the digital word. Similarly, a more cautious response in the addicted group was also explained by Social Consequences score. It could be that, among individuals with low-medium SMA symptom severity, a lower risk taking is a cognitive response to past consequences of a SMA, although studies regarding this matter are needed.

The digital world is growing exponentially. Every new year new users are entering SM and more than ever, we are the product being sold in these platforms, with constant new content available to us. Moreover, it became normalized to use and abuse SM. We

can shop through SM. People come home from work and unlock the phone to see what others have been doing through SM. Others work from home, having SM in the next google separator. Although an overuse of SM is a recent preoccupation of society, our findings failed to identify an impairment on inhibitory control and cognitive flexibility in individuals with low-medium SMA symptomology severity, core cognitive components that have been shown to be compromised in both behavioural and substance addictions.

Finally, several limitations of the study should be acknowledged. Firstly, our sample and subsamples were small, thus limiting any conclusions and generalizations of the present findings. Secondly, even though experimental paradigms have the advantage of measuring implicit processes, whose results are not susceptible to social desirability, it is important to acknowledge that real life tasks do not reassemble them. As such, it would be interesting to develop a project where real life tasks, that require cognitive flexibility and inhibitory control, are used instead. Thirdly, ASMS is not a scale that measures specific SMA (e.g., Facebook Addiction). Therefore, the lack of significances found between groups and in correlation analysis could be due to an addiction to specific SM (e.g., Instagram) . In future studies, it would be interesting to measure addiction to specific platforms, such as Instagram. Fourthly, our sample was limited in the range of addiction symptoms. Most of participants had low to medium levels of addiction, so future research should lookout for groups with extreme high addiction scores to seek larger differences between LoA. Fifthly, part of the study was correlational, making interpretation of the results difficult. In this sense, caution regarding causality arguments should be taken. Finally, there is data suggesting that the type of SM activities (direct communication, content production and content consumption) can mediate de consequences of SM use (Thorisdottir et al., 2019). As such, future studies should consider the type of SM activity as a possible variable related to SMA. Finally, all data collection was online, meaning that unforeseen complications could have occurred, such as problems with internet service, a misunderstanding of instructions, or carrying out the experiment in a noisy and distracting environment.

References

American Psychological Association [APA] (n/d). *APA Dictionary of Psychology: Go/no-go*. American Psychological Association. https://dictionary.apa.org/gono-go

Albein-Urios, N., Martinez-González, J.M., Lozano, O., Clarck, L., & Verdejo-García, A. (2012). Comparison of impulsivity and working memory in cocaine addiction and pathological gambling: Implications for cocaine-induced neurotoxicity. *Drug and Alcohol Dependence, 126(*1-2), 1-6. https://doi.org/10.1016/j.drugalcdep.2012.03.008

Aydın, O., Obuća, F., Boz, C., & Ünal-Aydın, P. (2020). Associations between executive functions and problematic social networking sites use. *Journal of Clinical and Experimental Neuropsychology*, *42*(6), 634-645. https://doi.org/10.1080/13803395.2020.1798358

Azaraeen, S., & Memarian, S. (2015). *Comparison of cognitive failures in addicts and non addicts.* Sixth International Conference of Cognitive Science (ICCS), Institute for Cognitive Science Studies, Iran. https://doi.org/10.1109/COGSCI.2015.7426663

Barthorpe, A., Winstone, L., Mars, B., & Moran, P. (2020). Is social media screen time really associated with poor adolescent mental health? A time use diary study. *Journal of Affective Disorders*, *274*, 864-870. https://doi.org/10.1016/j.jad.2020.05.106

Berry, N., Emsley, R., Lobban, F., & Bucci, S. (2018). Social media and its relationship with mood, self-esteem and paranoia in psychosis. *Acta Psychiatrica Scandinavica, 138*(6), 558-570. https://doi.org/10.1111/acps.12953

Bertoquini, V., & Pais-Ribeiro, J.L. (2006). Estudo de formas muito reduzidas do Modelo dos Cinco Fatores da Personalidade. *Psychologica, 43*, 193-210. https://www.researchgate.net/profile/Jose_Pais-Ribeiro/publication/310458188

Billieux, J., Schimmenti, A., Khazaal, Y., Maurage, P., & Hereen A. (2015). Are we overpathologizing everyday life? A tenable blueprint for behavioral addiction research. *Journal of Behavioral Addictions, 4*(3), 119-123. https://doi.org/10.1556/2006.4.2015.009

Biolcati, R., Mancini, G., Pipi, V., & Mugheddu, V. (2018). Facebook addiction: Onset predictors. *Journal of Clinical Medicine, 7*(6), 118. https://doi.org/10.3390/jcm7060118

Brand, M., Young, K.S., Laier, C., Wölfling, K., & Potenza, M.N. (2016). Integrating psychological and neurobiological considerations regarding the development and maintenance of specific Internet-use disorders: An Interaction of Person-Affect-Cognition-Execution (I-PACE) model. *Neuroscience and Biobehavioral Reviews, 71*, 252-266. https://doi.org/10.1016/j.neubiorev.2016.08.033

Brooks, S. (2015). Does personal social media usage affect efficiency and well-being? *Computers in Human Behavior, 46*, 26-37. https://doi.org/10.1016/j.chb.2014.12.053

Brunborg, G.S., & Andreas, J.B. (2019). Increase in time spent on social media is associated with modest increase in depression, conduct problems, and episodic heavy drinking. *Journal of adolescence, 74*, 201-209. https://doi.org/10.1016/j.adolescence.2019.06.013

Cheak, A.P.C., Goh, G.G.G., & Chin, T.S. (2012, October 15-16*). Online social networking addiction: Exploring its relationship with social networking dependency and mood modification among undergraduates in Malaysia*. International Conference on Management, Economics and Finance (ICMEF 2012) Proceeding, Sarawak, Malaysia. https://www.academia.edu/3034157

Clement, J. (2020, November 24). *Facebook: Number of monthly active users worldwide 2008-2020*. Statista. https://www.statista.com/statistics/264810/

Clement, J. (2020a, February 26). *Daily social media usage worldwide 2012-2019*. Statista. https://www.statista.com/statistics/433871/

Decker, S. & Gay, J.N. (2011). Cognitive-bias toward gaming-related words and disinhibition in World of Warcraft gamers. *Computers in Human Behavior, 27*(2), 798-810. https://doi.org/10.1016/j.chb.2010.11.005

Delaney, D., Stein, L.A.R., & Gruber, R. (2017). Facebook addiction and impulsive decision-making. *Addiction Research & Theory, 26*(6), 1-9. https://doi.org/10.1080/16066359.2017.1406482

Durak, H. Y., & Seferoğlu, S. S. (2019). Modeling of variables related to problematic social media usage: Social desirability tendency example. *Scandinavian Journal of Psychology, 20*(3), 277-288. https://doi.org/10.1111/sjop.12530

Fioravanti, G., Prostamo, A., & Casale, S. (2019). Taking a short break from Instagram: The effects on subjective well-being. *Cyberpsychology, Behavior, and Social Networking, 23*(2), 107-112. https://doi.org/10.1089/cyber.2019.0400

Firth, J., Torous, J., Stubbs, B., Firth, J. A., Steiner, G.Z., Smith, L., Alvarez-Jiminez, M., Gleeson, J., Vancampfort, D., Armitage, C. J., & Sarris, J. (2019). The "online brain": how the Internet may be changing our cognition. *World Psychiatry, 18*(2), 119-129. https://doi.org/10.1002/wps.20617

Gao, Q., Jia G., Zhao, J. & Zhang, D. (2019). Inhibitory control in excessive social networking users: Evidence from an event-related potential-based Go-Nogo Task. *Frontiers in Psychology, 10*. https://doi.org/10.3389/fpsyg.2019.01810

Gomes, A.A., Marques, D.R., Meia-Via, A.M., Meia-Via, M., Tavares, J., Silva, C.F., & Azevedo, M.H.P. (2015). Basic Scale on Insomnia complaints and Quality of Sleep (BaSIQS): Reliability, initial validity and normative scores in higher education students. *Chronobiology International, 32*(3), 428-440. https://doi.org/10.3109/07420528.2014.986681

Griffiths, M.D. & Kuss, D. (2017). Adolescent social media addiction (revisited). *Education and Health, 35*(3), 49-52. https://www.researchgate.net/publication/320146297

Hadlington, L. J. (2015). Cognitive failures in daily life: Exploring the link with Internet addiction and problematic mobile phone use. *Computers in Human Behavior, 51*, 75–81. https://doi.org/10.1016/j.chb.2015.04.036

Heuer, A., Mennig M., Schubo, A. & Barke, A. (2020). Impaired disengagement of attention from computer-related stimuli in Internet Gaming Disorder: Behavioral and electrophysiological evidence. *Journal of Behavioral Addictions, 10*(1), 77-87. https://doi.org/10.1556/2006.2020.00100

Hønsi, A., Mentozoni, R. A., Molde, H., & Pallesen, S. (2013). Attentional bias in Problem Gambling: A systematic review. *Journal of Gambling Studies, 29*, 359-375. https://doi.org/10.1007/s10899-012-9315-z

Hormes, J.M., Kearns, B., & Timko, C.A. (2014). Craving Facebook? Behavioral addiction to online social networking and its association with emotion regulation deficits. *Addiction, 109*(12), 2079-2088. https://doi.org/10.1111/add.12713

Hou, Y., Xiong, D., Jiang, T., Song, L., & Wang, Q. (2019). Social media addiction: Its impact, mediation, and intervention. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace, 13*(1). https://doi.org/10.5817/CP2019-1-4

Johnson, J. (2021, January 27). *Age distribution of internet users worldwide 2019*. Statista. https://www.statista.com/statistics/272365/age-distribution-of-internet-users-worldwide/

Kashdan, T.B. (2010). Psychological flexibility as a fundamental aspect of health. *Clinical Psychology Review, 30*(7), 865-878. https://doi.org/10.1016/j.cpr.2010.03.001

Li, W., O'Brien, J.E., Snyder, S.M., Howard, M.O. (2015). Characteristics of Internet addiction/pathological Internet use in U.S. university students: A qualitative-method investigation. *PLoS One, 10*(2), 1-19. https://doi.org/10.1371/journal.pone.0117372

Lins, S.L.B., Campos, M., Leite, A.C., Carvalho, C.L., Cardoso, S., & Natividade, J.C. (2016). Evidências de validade da Escala de Orientação para a Comparação Social (INCOM) para o contexto de adolescentes portugueses. *Revista da Associação Portuguesa de Psicologia, 30*(1), 1-14. https://doi.org/10.17575/rpsicol.v30i1.1034

Lira, V.M.A.L. (2016). *Avaliação da adição às redes sociais e da psicopatologia em jovens estudantes portugueses* (Master's thesis, Universidade Lusófona do Porto). http://hdl.handle.net/10437/7848

Marino, C., Vieno, A., Moss, A.C., Caselli, G., Nikčević, A.V., & Spada, M.M. (2016). Personality, motives and metacognitions as predictors of problematic Facebook use in university students. *Personality and Individual Differences, 101*, 70-77. https://doi.org/10.1016/j.paid.2016.05.053

Meshi, D., Elizarova, A., Bender, A., & Verdejo-Garcia, A. (2019). Excessive social media users demonstrate impaired decision making in the Iowa Gambling Task.

Journal of Behavioral Addictions, 8(1), 169-173. https://doi.org/10.1556/2006.7.2018.138

Moretta, T., & Buodo, G. (2021). Response inhibition in problematic social network sites use: an ERP study. *Cognitive, Affective & Behavioral Neuroscience, 21*(4), 668-880. https://doi.org/10.3758/s13415-021-00879-9

Odlaug, B.L., Chamberlain, S.R., Kim, S.W., Schreiber, L.R.N., & Grant, J.E. (2011). A neurocognitive comparison of cognitive flexibility and response inhibition in gamblers with varying degrees of clinical severity. *Psychological Medicine, 41*(10), 2111-2119. https://doi.org/10.1017/S0033291711000316

Özgüven, N., & Mucan, B. (2013). The relationship between personality traits and social media use. *Social Behavior and Personality, 41*(3), 517-528. https://doi.org/10.2224/sbp.2013.41.3.517

Pais-Ribeiro, J., Silva, I., Martins, A., Meneses, R., & Baltar, M. (2007). Validation study of a Portuguese version of the Hospital Anxiety and Depression Scale. *Psychology, Health & Medicine, 12*(2), 225-237. https://doi.org/10.1080/13548500500524088

Potenza, M.N. (2008). The neurobiology of pathological gambling and drug addiction: An overview and new findings. *Philosophical Transactions of the Royal Society of London, 363*(1507), 3181-3189. https://doi.org/10.1098/rstb.2008.0100

Sheldon, P., Antony, M.G., & Sykes, B. (2020). Predictors of problematic social media use: Personality and life-position indicators. *Psychological Reports, 124*(3), 1110-1133. https://doi.org/10.1177/0033294120934706

Shensa, A., Escobar-Viera, C., Sidani, J.E., Bowman, N.D., Marshal, M.P., & Primack, B.A. (2017). Problematic social media use and depressive symptoms among U.S. young adults: A nationally-representative study. *Social Science & Medicine, 182,* 150-157. https://doi.org/10.1016/j.socscimed.2017.03.061

Sindermann, C., Elhai, J.D., & Montag, C. (2020). Predicting tendencies towards the disordered use of Facebook's social media platforms: On the role of personality, impulsivity, and social anxiety. *Psychiatry Research, 285*, 1-7. https://doi.org/10.1016/j.psychres.2020.112793

Stieger, S., & Lewetz, D. (2018). A week without using social media: Results from an ecological momentary intervention study using smartphones. *Cyberpsychology, Behavior, and Social Networking, 21*(10), 618-624. https://doi.org/10.1089/cyber.2018.0070

Thompson, K., Hunter, S.C., Butler, S.H. & Robertson, D.J. (2021). Social media 'addiction': The absence of an attentional bias to social media stimuli. *Journal of Behavioral Addictions, 10*(2), 302-313. https://doi.org/10.1556/2006.2021.00011

Thorisdottir, I.E., Sigurvinsdottir, R., Asgeirsdottir, B.B., Allegrante, J.P., & Sigfusdottir, I.D. (2019). Active and passive social media use and symptoms of anxiety and depressed mood among Icelandic adolescents. *Cyberpsychology Behavior and Social Networking, 22*(8), 535-542. https://doi.org/10.1089/cyber.2019.0079

Tromholt, M. (2016). The Facebook experiment: Quitting Facebook leads to higher levels of well-being. *Cyberpsychology, Behavior, and Social Networking, 19*(11), 661-666. https://doi.org/10.1089/cyber.2016.0259

Turel, O., He, Q., Xue, G., Xiao, L., & Bechara, A. (2014). Examination of neural systems sub-serving Facebook "addiction". *Psychological Reports, 115*(3), 675-695. https://doi.org/10.2466/18.PR0.115c31z8

van Holst, R. J., van Holstein, M., van den Brink, W., Veltman, D. J., & Goudriaan, A. E. (2012). Response inhibition during cue reactivity in problem gamblers: An fMRI study. *PLos ONE, 7*(3). https://doi.org/10.1371/journal.pone.0030909

Vannucci, A., Flannery, K.M., & Ohannessian, C.M. (2017). Social media use and anxiety in emerging adults. *Journal of Affective Disorders, 207*, 163-166. https://doi.org/10.1016/j.jad.2016.08.040

Vashishtha, S., Ahuja, S., & Sharma, M. (2017). Impact of Facebook Addiction Disorder (FAD) on study habits and academic achievement of adolescents. *MIER Journal of Educational Studies, Trends & Practices, 7*(2), 195-207. https://www.researchgate.net/publication/322329881

Vogel, E.A., Rose, J.P., Roberts, L.R., & Eckles, K. (2014). Social comparison, social media, and self-esteem. *Psychology of Popular Media Culture, 3*(4), 206-222. https://doi.org/10.1037/ppm0000047

Wegmann, E., & Brand, M. (2016). Internet-communication disorder: It's a matter of social aspects, coping, and internet-use expectancies. *Frontiers in Psychology*, *7*(1747), 1–13. https://doi.org/10.3389/fpsyg.2016.01747

Wegmann, E., Ostendorf, S., & Brand, M. (2018). Is it beneficial to use Internet-communication for escaping from boredom? Boredom proneness interacts with cue-induced craving and avoidance expectancies in explaining symptoms of Internet-communication disorder. *PLoS One, 13*(4), 1-18. https://doi.org/10.1371/journal.pone.0195742

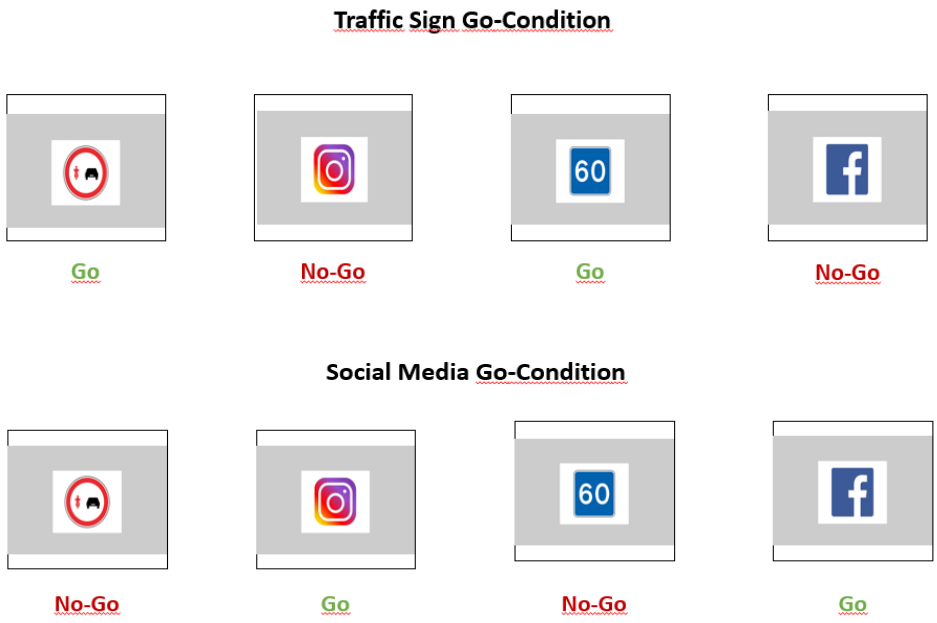
Xanidis, N., & Brignell, C.M. (2016). The association between the use of social network sites, sleep quality and cognitive function during the day. *Computers in human behavior, 55*, 121-126. https://doi.org/10.1016/j.chb.2015.09.004

Yoon, S., Kleiman, M., Mertz, J., & Brannick, M., (2019). Is social network site usage related to depression? A meta-analysis of Facebook-depression relations. *Journal of Affective Disorders, 248,* 65-72. https://doi.org/10.1016/j.jad.2019.01.026

Zhou, Z., Yuan, G., & Yao, J. (2012). Cognitive biases toward Internet game-related pictures and executive deficits in individuals with an Internet game addiction. *PLos One, 7*(11), 1-9. https://doi.org/10.1371/journal.pone.0048961

Appendix

Appendix A. Illustrative scheme regarding the correct responses to different Go-Conditions



Appendix

Appendix B. Informed Consent

Por favor, leia com atenção o conteúdo abaixo. Se considerar que algo não se encontra claro, não hesite em solicitar mais informações.

Sou estudante do último ano do Mestrado em Psicologia da Saúde e Reabilitação Neuropsicológica da Universidade de Aveiro, e encontro-me neste momento a realizar a minha dissertação, sob a orientação científica da Professora Doutora Sara Monteiro e coorientação da Professora Doutora Isabel Santos. Neste sentido, venho apelar à sua participação no estudo que estou a realizar e que irá decorrer em duas etapas consecutivas. A primeira etapa consiste na obtenção de informação pessoal, que será a mínima necessária para os objetivos do estudo e na resposta a alguns questionários. A segunda etapa consiste na realização de uma tarefa experimental online.

Antes de iniciar a sua participação, leia com atenção a seguinte informação.

A participação neste estudo implica o cumprimento do seguinte conjunto de critérios de inclusão:

- Ter entre 18-35 anos;

- Saber ler e compreender a língua portuguesa;

- Não ter, no momento presente, nenhum problema visual diagnosticado, ou no caso de ter, o mesmo encontrar-se corrigido (óculos ou lentes);

- Não ter, no momento presente, nenhum diagnóstico de perturbação mental;

- Ser estudante universitário;

Caso não cumpra um dos critérios acima mencionados, agradecemos a sua disponibilidade, mas a sua participação ficará por aqui.

Caso cumpra todos os critérios acima mencionados, por favor avance para a página seguinte.

Objetivo da Experiência

Este estudo tem como objetivo estudar a relação entre o nível de dependência das redes sociais e o funcionamento cognitivo.

População-Alvo

O estudo destina-se a estudantes universitários com idade entre os 18-35 anos.

Procedimento Específico

Este estudo é constituído por duas etapas. Na primeira etapa, ser-lhe-á solicitado que preencha um questionário sociodemográfico e cinco questionários relativamente breves. Estes têm como objetivo: 1) recolher alguns dados sociodemográficos; 2) identificar o seu nível de dependência das redes sociais; 3) avaliar a sua qualidade e quantidade de sono; 4) e avaliar algumas características pessoais, estado emocional e bem-estar psicológico. No final dos questionários haverá um link que o/a encaminhará para a segunda etapa do estudo. Esta primeira etapa terá uma duração estimada de 10 minutos. Ainda nesta primeira etapa irá definir um código de participante composto pelos 4 últimos dígitos do seu número de identificação fiscal (NIF), que o/a passará a identificar na fase seguinte, para que a sua participação seja inteiramente anónima

Na segunda etapa, ser-lhe-á solicitado que realize uma tarefa online através da plataforma "Pavlovia", plataforma com a qual a Universidade de Aveiro estabeleceu contrato de tratamento de dados que assegura uma efetiva privacidade e proteção de dados pessoais dos participantes. Esta tarefa terá duas partes: (1) uma onde terá que pressionar a tecla "espaço" cada vez que observar uma imagem relacionada com as redes sociais e deverá ignorar imagens relacionadas com sinais de trânsito; e (2) outra em que terá que pressionar a tecla "espaço" quando aparecer uma imagem relacionada com sinais de trânsito e deverá ignorar as imagens relacionadas com as redes sociais. Esta tarefa terá uma duração total de cerca de 20 minutos.

Duração

O presente estudo terá uma duração aproximada de 30 minutos.

Natureza Voluntária

A sua participação no estudo é voluntária, tendo a opção de desistir do mesmo a qualquer momento sem que haja qualquer tipo de penalização. Caso queira desistir, a meio ou no final do estudo, bastará carregar em "Sair e limpar inquérito", no canto superior direito do ecrã, e nenhum dos seus dados será gravado.

Riscos Associados

A participação neste estudo não envolve qualquer risco ou desconforto para o participante para além dos normalmente encontrados na sua rotina diária. Qualquer que seja a decisão que tome não será prejudicado/a, nem por participar, nem por recusar participar neste estudo, podendo optar por desistir da tarefa a qualquer momento.

Benefícios Associados

Com a participação neste estudo estará a contribuir para aprofundar o conhecimento na área da psicologia.

Confidencialidade e Anonimização:

A informação fornecida ou quaisquer dados recolhidos ao longo deste estudo serão usados apenas para fins de investigação científica, estando salvaguardada a total confidencialidade e anonimato das informações recolhidas. Em nenhum momento do estudo serão recolhidos dados pessoais identificativos.

Os dados dos inquéritos serão descarregados regularmente das plataformas forms.ua.pt e Pavlovia diretamente para um servidor seguro da UA. Após o download dos dados da plataforma estes serão apagados da mesma.

Responsáveis pelo Tratamento:

A responsável pelo tratamento dos dados é a estudante de mestrado Diana Filipe. A responsável pelo tratamento tem acesso aos dados pessoais anónimos. Os dados pessoais não serão comunicados a nenhuma entidade nem há possibilidade de serem transferidos para países terceiros.

Acesso e partilha dos dados anonimizados:

Todos os elementos da equipa de investigação do projeto têm acesso à base de dados. Os dados anónimos podem também ser partilhados com revistas internacionais ao abrigo do movimento open data e apresentados em apresentações públicas, congressos científicos e outras publicações.

Contactos/ Esclarecimentos:

Para qualquer questão adicional, poderá contactar a aluna responsável através do seguinte endereço de e-mail: diana.filipe98@ua.pt .

Declaração de Consentimento Informado

Ao selecionar SIM na caixa abaixo, declaro que:

Tenho 18 anos ou mais, que tomei conhecimento do objetivo do estudo e do que tenho de fazer para participar no mesmo. Declaro também que tive oportunidade de ler na íntegra este consentimento informado, que o considero explícito e que concordo com o seu conteúdo. Fui informado/a que tenho o direito de recusar participar ou desistir em qualquer momento do estudo, e que essa recusa ou desistência não terão consequências para mim. Foi-me garantido o anonimato da minha participação neste estudo.

Assim declaro que aceito participar de livre vontade na presente investigação, conduzida em estrita obediência ao Regulamento Geral de Proteção de Dados e da sua Lei de Execução Nacional.

Se escolher **NÃO**, a sua participação terminará por aqui.

Após a decisão, carregue no botão "seguinte"**.**

Appendix C. Socio-Demographic Questionnaire

1. **Idade:___**
2. **Género:** Feminino___ Masculino___Outro___
3. **Possui alguma perturbação mental diagnosticada?** Sim___ Não___
4. **Encontra-se neste momento a estudar no ensino superior?** Sim___ Não___
5. **A seguir estão apresentadas um conjunto de redes sociais. Selecione aquelas que costuma utilizar e indique a frequência e tempo de utilização diária em relação a cada uma delas.**
    a. **Facebook ___**
        i. De 0-10, sendo "0" "Nada" e "10" "Extremamente", quão frequentemente (quantas vezes) a utiliza diariamente?_____
        ii. Diariamente, em média, tende a passar quanto tempo nesta plataforma? _____
    b. **Instagram ___**
        i. De 0-10, sendo "0" "Nada" e "10" "Extremamente", quão frequentemente (quantas vezes) a utiliza diariamente?_____
        ii. Diariamente, em média, tende a passar quanto tempo nesta plataforma? _____
    c. **Twitter ___**
        i. De 0-10, sendo "0" "Nada" e "10" "Extremamente", quão frequentemente (quantas vezes) a utiliza diariamente?_____
        ii. Diariamente, em média, tende a passar quanto tempo nesta plataforma? _____
    d. **LinkedIn ___**
        i. De 0-10, sendo "0" "Nada" e "10" "Extremamente", quão frequentemente (quantas vezes) a utiliza diariamente?_____
        ii. Diariamente, em média, tende a passar quanto tempo nesta plataforma? _____

e. **YouTube ___**
    i. De 0-10, sendo “0” “Nada” e “10” “Extremamente”, quão frequentemente (quantas vezes) a utiliza diariamente?_____
    ii. Diariamente, em média, tende a passar quanto tempo nesta plataforma? _____
f. **Tik-Tok ___**
    i. De 0-10, sendo “0” “Nada” e “10” “Extremamente”, quão frequentemente (quantas vezes) a utiliza diariamente?_____
    ii. Diariamente, em média, tende a passar quanto tempo nesta plataforma? _____
g. **Snapchat ___**
    i. De 0-10, sendo “0” “Nada” e “10” “Extremamente”, quão frequentemente (quantas vezes) a utiliza diariamente?_____
    ii. Diariamente, em média, tende a passar quanto tempo nesta plataforma? _____
h. **Skype ___**
    i. De 0-10, sendo “0” “Nada” e “10” “Extremamente”, quão frequentemente (quantas vezes) a utiliza diariamente?_____
    ii. Diariamente, em média, tende a passar quanto tempo nesta plataforma? _____
i. **WhatsApp ___**
    i. De 0-10, sendo “0” “Nada” e “10” “Extremamente”, quão frequentemente (quantas vezes) a utiliza diariamente?_____
    ii. Diariamente, em média, tende a passar quanto tempo nesta plataforma? _____
j. Tumblr ___
    i. De 0-10, sendo “0” “Nada” e “10” “Extremamente”, quão frequentemente (quantas vezes) a utiliza diariamente?_____

ii. Diariamente, em média, tende a passar quanto tempo nesta plataforma? _____

k. **Outro ___**

i. De 0-10, sendo "0" "Nada" e "10" "Extremamente", quão frequentemente (quantas vezes) a utiliza diariamente?_____

ii. Diariamente, em média, tende a passar quanto tempo nesta plataforma? _____

6. **Ordene, da mais importante para a menos importante, as razões pelas quais utiliza as redes sociais** (por exemplo, 1 – para melhorar o meu humor (mais importante); 2 – para conhecer pessoas novas (segunda mais importante); e assim por adiante).

a. Uso as redes sociais:

i. Para melhorar o meu humor ___

ii. Para me distrair dos problemas ___

iii. Medo de estar a perder experiências que os outros estão a ter sem mim ___

iv. Para conhecer pessoas novas ___

v. Por motivos escolares ___

vi. Para fortalecer laços sociais ___

vii. Para comunicar com quem não tenho contacto físico ___

viii. A maior parte das pessoas que conheço tem conta nessa rede social ___

ix. Para não me sentir excluído ___

x. Para poder partilhar pensamentos, comentários, vídeos ou fotografias ___

xi. Para promover causas ou posições sociais e políticas ___

xii. Ver o que os outros estão a fazer ___

xiii. Por aborrecimento___

xiv. Outro ___

7. **De 0-10, sendo "0" "Nada" e "10" "Extremamente", quão frequentemente nas redes sociais:**

a. Mandas uma mensagem, imagem ou vídeo privado? ___

b. Mandas uma mensagem, imagem ou vídeo privado que desaparece após ser visto? ___
c. Publicas uma imagem ou vídeo relativos à tua vida pessoal? ___
d. Visualizas os perfis ou contas dos teus amigos? ___
e. Procuras perfis ou contas de outros que não conheces? ___
f. Publicas outras coisas que não imagens nas redes sociais, como links, jogos, notícias ou páginas web? ___

8. **De 1-10, sendo "1" "Nada" e "10" "Extremamente", quão frequentente se compara socialmente a outros nas redes sociais?**

   Nada 1 2 3 4 5 6 7 8 9 10 Extremamente

   a. **De que forma estas comparações lhe fazem sentir:**
      i. Inferior 1 2 3 4 5 6 7 8 9 10 Superior
      ii. Incompetente 1 2 3 4 5 6 7 8 9 10 Mais competente
      iii. Sem talento 1 2 3 4 5 6 7 8 9 10 Mais talentoso
      iv. Inseguro 1 2 3 4 5 6 7 8 9 10 Mais seguro
      v. Não atraente 1 2 3 4 5 6 7 8 9 10 Mais atraente
      vi. Um desajustado 1 2 3 4 5 6 7 8 9 10 Um ajustado

Appendix D. Addiction to Social Media Scale (Al-Menayes, 2015; Portuguese version by Lira, 2016)

Instruções: Por favor preencha as seguintes perguntas da forma mais honesta possível. Assinale, num dos espaços à direita de cada item, aquele que melhor descreve **o GRAU DE CONCORDÂNCIA NOS ÚLTIMOS 6 MESES**:

	Discordo Totalmente	**Discordo**	**Nem Discordo/Nem Concordo**	**Concordo**	**Concordo Totalmente**
1. Utilizo muito mais vezes as redes sociais do que pretendia.					
2. Considero que a vida sem as redes sociais seria aborrecida.					
3. Tenho abdicado muitas vezes do meu trabalho escolar/estágio por causa das redes sociais.					
4. Fico irritado se alguém me interrompe quando estou a utilizar as redes sociais.					
5. Não sintto necessidade de utilizar as redes sociais durante vários dias.					
6. Não me apercebo da passagem do tempo quando					

estou a utilizar as redes sociais.	
7. É-me difícil adormecer logo após a utilização das redes sociais.	
8. Fico aborrecido(a) se tivesse que reduzir a quantidade de tempo que passo nas redes sociais.	
9. Os meus familiares queixam-se frequentemente da importância que dou às redes sociais.	
10. As minhas notas escolares desceram por causa da utilização das redes sociais.	
11. Costumo usar as redes sociais durante o horário escolar/estágio.	
12. Costumo cancelar encontros com os meus amigos por causa da necessidade que tenho de utilizar as redes sociais.	
13. Dou por mim várias vezes a pensar sobre o que aconteceu nas redes sociais	

mesmo quando não as estou a utilizar.	
14. Sinto que a minha dependência das redes sociais tem aumentado significativamente e desde que as comecei a utilizar.	

Appendix E. Basic Scale on Insomnia and Quality of Sleep (BaSIQS) (Gomes et al., 2015)

Instruções: Ao responder às questões que se seguem, considere o que costuma acontecer **habitualmente** numa **semana típica**, ao longo do último mês:

1. Quando se deita, em regra, quanto tempo demora a adormecer:

○ 1-14 min
○ 15-30 min
○ 31-45 min
○ 46-60 min
○ 46-60 min

2. Quantas vezes costuma acordar durante a noite?

○ 0 vezes
○ 1 vez por noite
○ 2-3 vezes
○ 4-5 vezes
○ 6 vezes ou mais

3. Costuma acordar espontaneamente mais cedo do que a hora desejada?

○ Nunca
○ Raramente
○ 3-4 noites por semana
○ Quase todas ou todas as noites

4. Acordar durante a noite ou antes da hora desejada costuma ser um problema para si?

○ Nunca
○ Muito pouco

- ○ Um pouco
- ○ Muito
- ○ Muitíssimo

5. Normalmente, como é o seu sono (independentemente das horas que dorme)?

a. Qualidade de sono:

- ○ Muito mau
- ○ Mau
- ○ Razoável
- ○ Bom
- ○ Muito bom

6. Normalmente, como é o seu sono (independentemente das horas que dorme)?

b. Profundidade de sono:

- ○ Muito leve
- ○ Leve
- ○ Mais ou menos pesado
- ○ Pesado
- ○ Muito pesado

Appendix F. Social Comparison Orientation Scale (INCOM) (Gibbons & Buunk, 1999; adaptação portuguesa de por Lins, Campos, Leite, Carvalho, Cardoso & Natividade, 2016)

Instruções: A maioria das pessoas compara-se, de vez em quando, com as outras. Elas podem comparar os seus sentimentos, opiniões, capacidades e/ou a sua situação com a das outras. Não existe particularmente nada de bom ou de mau neste tipo de comparações e algumas pessoas fazem-no com mais frequência do que outras. As perguntas a seguir tentam determinar com que frequência se compara com os outros e como se sente ao realizar essas comparações. Para isso é necessário, por favor, que selecione a opção de resposta que mais se adequa ao seu caso em cada item.

	Discordo Totalmente	**Discordo Muito**	**Discordo Pouco**	**Indiferente**	**Concordo Pouco**	**Concordo Muito**	**Concordo Totalmente**
1. Comparo como as pessoas mais próximas a mim (Ex. Famílias, amigos, namorado(a) agem com as outras).							
2. Presto sempre muita atenção ao modo como faço as coisas, comparando-as com o modo							

como os outros as fazem.

3. Se quero saber se o que estou a fazer está bem, comparo o que faço com o que os outros fazem.	
4. Comparo o meu desenvolvimento social (por exemplo: habilidades sociais, popularidade) em relação às outras pessoas.	
5. Não sou uma pessoa que se compara com as outras.	
6. Comparo-me com os outros em relação ao que tenho conquistado na vida.	
7. Gosto de conversar com os outros sobre as opiniões e	

experiências em comum.	
8. Tento saber o que os outros pensam quando têm problemas semelhantes aos meus.	
9. Gosto sempre de saber o que os outros fariam no meu lugar.	
10. Se quero saber mais sobre algo, tento saber o que os outros pensam sobre isso.	
11.Nunca comparo a minha condição de vida com a das outras pessoas.	

Appendix G. Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983; adaptação portuguesa por Pais-Ribeiro, Silva, Ferreira, Martins & Baltar, 2007)

Instruções: Este questionário foi construído para ajudar a saber como se sente. Pedimos-lhe que leia cada uma das perguntas e selecione a resposta que melhor descreve a forma como se tem sentido na **última semana**. Não demore muito tempo a pensar nas respostas. A sua reação imediata a cada questão será provavelmente mais correta do que uma resposta muito ponderada.

	Quase sempre	**Muitas vezes**	**Por vezes**	**Nunca**
1. Sinto-me tenso(a) ou nervoso(a).				
2. Ainda sinto prazer nas coisas de que costumava gostar.				
3. Tenho uma sensação de medo, como se algo terrível estivesse para acontecer.				
4. Sou capaz de rir e ver o lado divertido das coisas.				
5. Tenho a cabeça cheia de preocupações.				
6. Sinto-me animado(a).				
7. Sou capa de estar descontraidamente sentado(a) e sentir-me relaxado(a).				
8. Sinto-me mais lento(a), como se fizesse as coisas mais devagar.				

9. Fico de tal forma apreensivo(a) (com medo), que até sinto um aperto no estômago.	
10. Perdi o interesse em cuidar do meu aspeto físico.	
11. Sinto-me de tal forma inquieto(a) que não consigo estar parado(a).	
12. Penso com prazer nas coisas que podem acontecer no futuro.	
13. De repente, tenho sensações de pânico.	
14. Sou capaz de apreciar um bom livro ou um programa de rádio ou televisão.	

Appendix H. NEO-FFI-20: Personality Inventory (Bertoquini & Pais Ribeiro, 2006)

Instruções: Leia cada afirmação com atenção. Para cada afirmação, na página abaixo, selecione a resposta que melhor corresponde à sua opinião. Não existem respostas certas nem erradas. Descreva as suas opiniões, rápida, espontânea e honestamente. Responda a todas as questões.

Assinale **"Discordo Fortemente"** se a afirmação for definitivamente falsa ou se discordar fortemente dela. Assinale **"Discordo"** se a afirmação for, na maior parte das vezes, falsa ou se discordar dela. **"Neutro"** se a afirmação for igualmente falsa e verdadeira, se não se decidir ou se a sua posição perante o que foi dito é completamente neutra. Assinale **"Concordo"** se a frase for, na maior parte das vezes, verdadeira ou se concordar com ela. Assinale **"Concordo Fortemente"** se a frase for definitivamente verdadeira ou se concordar fortemente com ela.

	Discordo Fortemente	**Discordo**	**Neutro**	**Concordo**	**Concordo Fortemente**
1. Raramente estou triste ou deprimido (a).					
2. Sou uma pessoa alegre e bem-disposta.					
3. A poesia pouco ou nada me diz.					
4. Tendo a pensar o melhor acerca das pessoas.					
5. Sou eficiente e eficaz no meu trabalho					

6. Sinto-me, muitas vezes, desamparado(a), desejando que alguém resolva os meus problemas por mim.	
7. Muitas vezes, sinto-me a rebentar de energia.	
8. Às vezes ao ler poesia e ao olhar para uma obra de arte sinto um arrepio ou uma onda de emoção.	
9. A minha primeira reação é confiar nas pessoas	
10. Sou uma pessoa muito competente.	
11. Raramente me sinto só ou abatido(a).	
12. Sou uma pessoa muito ativa.	
13. Acho as discussões filosóficas aborrecidas.	
14. Algumas pessoas consideram-me frio(a) e calculista.	
15. Esforço-me por ser excelente em tudo o que faço.	

16. Houve alturas em que já experimentei ressentimento e amargura.

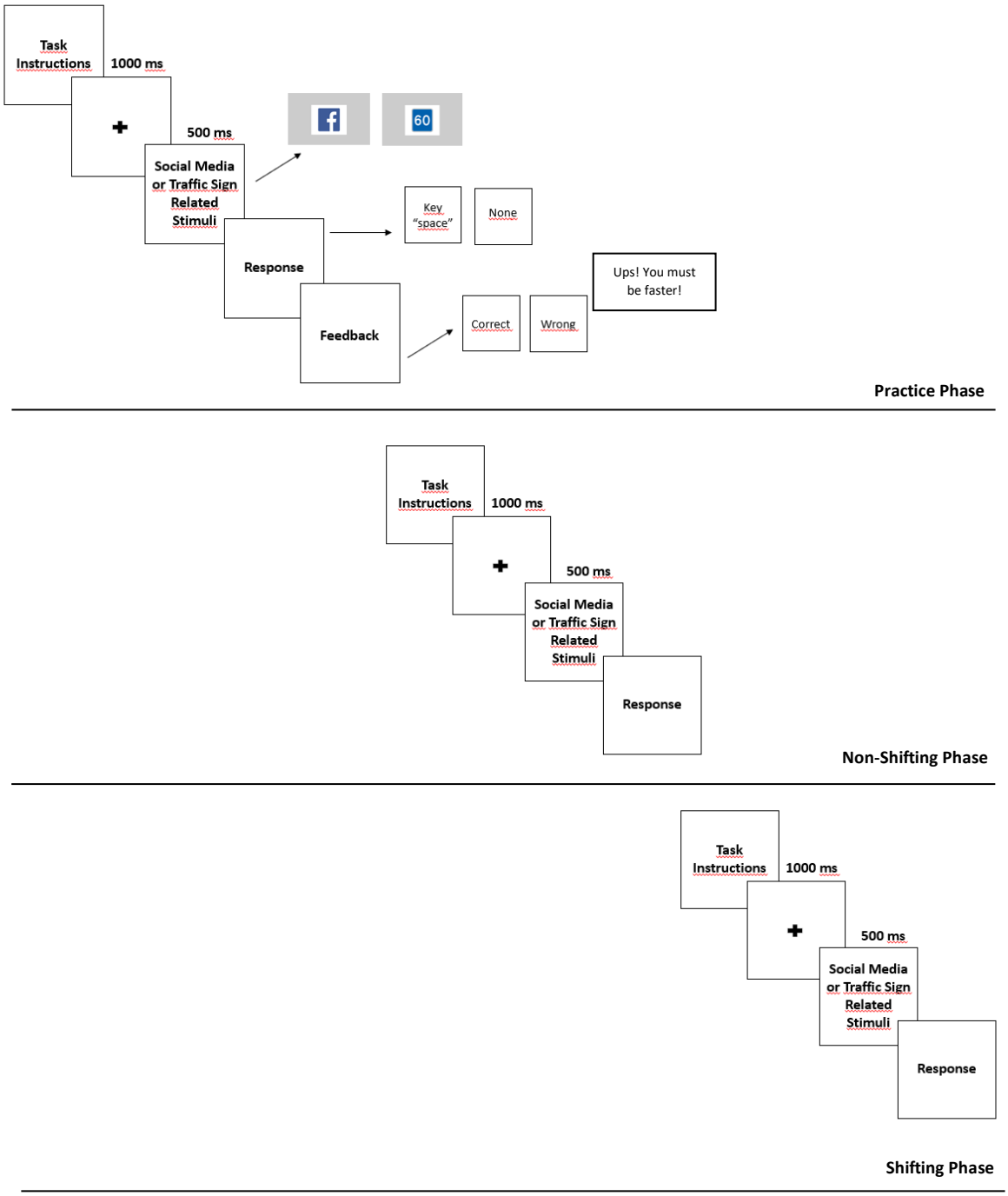
17. Sou dominador(a), cheio(a) de força e combativo(a)

18. Não dou grande importância às coisas da arte e da beleza.

19. Tendo a ser descrente ou a duvidar das boas intenções dos outros.

20. Sou uma pessoa aplicada, conseguindo sempre realizar o meu trabalho.

Appendix I. Illustrative scheme regarding the sequence of blocks of the Go-No Go Paradigm



Appendix J. Descriptive Statistics regarding results of the Go/No-Go Paradigm Go-Conditions

		Social Media Go-Condition	Traffic Sign Go-Condition
Reaction Time Go (ms)	Mean	.321	.311
	Median	.324	.315
	SD	.245	.026
Reaction Time (ms) No-Go	Mean	.297	.300
	Median	.298	.307
	SD	.029	.032
Hit Rate	Mean	.701	.715
	Median	.715	.715
	SD	.059	.043
False Alarm Rate	Mean	.091	.093
	Median	.095	.090
	SD	.033	.029
Sensitivity Index (*d'*)	Mean	1.896	1.916
	Median	1.939	1.929
	SD	.278	.209
Decision Bias (C)	Mean	.416	.385
	Median	.407	.381
	SD	.135	.120

Appendix K. Descriptive Statistics regarding results of the Go/No-Go Paradigm Go-Conditions, considering the Level of Addiction

			Mean	SD	Median
Social Media Go-Condition	No_Risk	Reaction Time (ms) Go	.306	.023	.304
		Reaction Time (ms) No-Go	.280	.025	.281
		Hit Rate	.713	.047	.725
		False Alarm Rate	.106	.029	.108
		Sensitivity Index (*d'*)	1.830	.213	1.875
		Decision Bias (C)	.348	.208	.356
	At_Risk	Reaction Time (ms) Go	.325	.026	.328
		Reaction Time (ms) No-Go	.300	.030	.304
		Hit Rate	.691	.071	.715
		False Alarm Rate	.092	.033	.095
		Sensitivity Index (*d'*)	1.866	.293	1.931
		Decision Bias (C)	.429	.147	.407
	Addicted	Reaction Time (ms) Go	.332	.012	.332
		Reaction Time (ms) No-Go	.306	.023	.306
		Hit Rate	.712	.033	.705
		False Alarm Rate	.071	.028	.065
		Sensitivity Index (*d'*)	2.062	.268	2.063
		Decision Bias (C)	.469	.101	.479
	No_Risk	Reaction Time (ms) Go	.307	.022	.313
		Reaction Time (ms) No-Go	.296	.032	.299
		Hit Rate	.720	.055	.718
		False Alarm Rate	.095	.025	.093
		Sensitivity Index (*d'*)	1.909	.210	1.811
		Decision Bias (C)	.367	.109	.364
		Reaction Time (ms) Go	.312	.027	.314

Traffic Sign Go-Condition	At_Risk	Reaction Time (ms) No-Go	.302	.030	.305
		Hit Rate	.709	.042	.715
		False Alarm Rate	.094	.032	.093
		Sensitivity Index (*d'*)	1.901	.235	1.934
		Decision Bias (C)	.396	.125	.387
	Addicted	Reaction Time (ms) Go	.313	.029	.316
		Reaction Time (ms) No-Go	.301	.041	.308
		Hit Rate	.726	.030	.715
		False Alarm Rate	.090	.029	.085
		Sensitivity Index (*d'*)	1.962	.129	1.940
		Decision Bias (C)	.377	.128	.389

Appendix L. Descriptive Statistics regarding results of the Go/No-Go Paradigm Go-Conditions, considering the Level of Addiction and Order of the Conditions

				N	Mean	Median	SD
Social Media Go-Condition	Reaction Time Go	No Risk	SM/TS	6	.315	.317	.017
			TS/SM	8	.299	.300	.026
		At-Risk	SM/TS	17	.325	.329	.023
			TS/SM	13	.324	.328	.030
		Addicted	SM/TS	8	.331	.330	.008
			TS/SM	3	.334	.341	.018
	Reaction Time No-Go	No Risk	SM/TS	6	.278	.282	.024
			TS/SM	8	.282	.281	.028
		At-Risk	SM/TS	17	.300	.305	.028
			TS/SM	13	.302	.303	.033
		Addicted	SM/TS	8	.299	.299	.023
			TS/SM	3	.322	.330	.014
	Hit Rate	No Risk	SM/TS	6	.720	.725	.026
			TS/SM	8	.708	.713	.059
		At-Risk	SM/TS	17	.690	.720	.082
			TS/SM	13	.691	.710	.055
		Addicted	SM/TS	8	.727	.728	.024
			TS/SM	3	.673	.675	.013
	False Alarm	No Risk	SM/TS	6	.083	.088	.023
			TS/SM	8	.123	.123	.020
		At-Risk	SM/TS	17	.086	.085	.029
			TS/SM	13	.098	.100	.037
		Addicted	SM/TS	8	.063	.065	.021
			TS/SM	3	.093	.095	.038
		No-Risk	SM/TS	6	1.980	1.948	.151

	Sensitivity Index (*d*')		TS/SM	8	1.717	1.694	.185
		At-Risk	SM/TS	17	1.888	1.954	.315
			TS/SM	13	1.837	1.851	.270
		Addicted	SM/TS	8	2.162	2.089	.204
			TS/SM	3	1.794	1.723	.257
	Decision Bias (C)	No-Risk	SM/TS	6	.406	.397	.091
			TS/SM	8	.306	.308	.104
		At-Risk	SM/TS	17	.440	.428	.125
			TS/SM	13	.415	.407	.177
		Addicted	SM/TS	8	.476	.483	.103
			TS/SM	3	.448	.449	.111
Traffic Sign Go-Condition	Reaction Time Go	No Risk	SM/TS	6	.309	.317	.025
			TS/SM	8	.305	.305	.022
		At-Risk	SM/TS	17	.310	.316	.021
			TS/SM	13	.315	.309	.034
		Addicted	SM/TS	8	.309	.316	.033
			TS/SM	3	.324	.331	.014
	Reaction Time No-Go	No Risk	SM/TS	6	.299	.302	.033
			TS/SM	8	.293	.296	.033
		At-Risk	SM/TS	17	.307	.310	.029
			TS/SM	13	.295	.284	.032
		Addicted	SM/TS	8	.295	.307	.046
			TS/SM	3	.317	.323	.014
	Hit Rate	No Risk	SM/TS	6	.728	.720	.037
			TS/SM	8	.714	.718	.067
		At-Risk	SM/TS	17	.703	.715	.049
			TS/SM	13	.718	.715	.030
		Addicted	SM/TS	8	.728	.725	.029
			TS/SM	3	.723	.710	.042
		No Risk	SM/TS	6	.110	.110	.025

False Alarm		TS/SM	8	.084	.080	.020
	At-Risk	SM/TS	17	.104	.115	.032
		TS/SM	13	.080	.080	.027
	Addicted	SM/TS	8	.099	.095	.095
		TS/SM	3	.068	.065	.025
Sensitivity Index (*d*')	No-Risk	SM/TS	6	1.844	1.861	.147
		TS/SM	8	1.958	2.015	.246
	At-Risk	SM/TS	17	1.817	1.795	.239
		TS/SM	13	2.012	2.063	.184
	Addicted	SM/TS	8	1.909	1.922	.102
		TS/SM	3	2.103	2.067	.077
Decision Bias (C)	No-Risk	SM/TS	6	.314	.294	.098
		TS/SM	8	.406	.410	.105
	At-Risk	SM/TS	17	.372	.381	.119
		TS/SM	13	.428	.393	.130
	Addicted	SM/TS	8	.347	.377	.112
		TS/SM	3	.455	.480	.158

Appendix M. Correlation Coefficients for the Study Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16	17.	18.	19.	20.	21.	22.	23.
1.RT SM Go Stimuli																							
2. RT TF No-Go Stimuli	.837**																						
3. RT TF Go Stimuli	.535**	.569**																					
4. RT SM No-Go Stimuli	.405**	.418**	.819**																				
5. Hit Rate SM Go-Condition	-.496**	-.560**	-.419**	-.303*																			
6. Hit Rate TS Go-Condition	-.226	-.274*	-.608**	-.536**	.434**																		
7. False Alarm Rate SM Go-Condition	-.503**	-.225	-.425**	-.316*	-.038	.127																	
8. False Alarm Rate TS Go-Condition	-.283*	-.352**	-.546**	-.478**	.056	.170	.425**																
9. d' SM Go-Condition	.114	-.128	.194	.123	.452**	.090	-.830**	-.353**															
10. d' TS Go-Condition	.179	.210	.252	.148	.111	.332*	-.389**	-.806**	.400**														
11. C SM Go-Condition	.684**	.504**	.569**	.399**	-.536**	-.365**	-.744**	-.387**	.292*	.237													
12. C TS Go-Condition	.339*	.392**	.721**	.623**	-.243	-.684**	-.363**	-.835**	.210	.382**	.484**												
13. Neuroticism score	.289*	.200	-.062	-.045	.035	.096	-.264	.029	.274*	-.017	.239	-.081											
14. Conscientiousness score	-.083	-.139	-.050	.054	-.023	-.040	-.043	.072	-.023	-.082	.087	-.020	-.077										
15. Depression score	-.078	-.036	-.190	-.141	.250	.242	-.086	-.067	.199	.152	-.102	-.103	.645**	-.278*									
16. Anxiety score	-.182	-.182	-.203	-.085	.239	.255	.065	.026	.100	.089	-.220	-.159	.426**	-.107	.559**								
17.BaSIQS score	.084	.025	-.014	.129	.204	.164	-.111	-.034	.207	.129	-.029	-.064	.440**	-.063	.432**	.385**							
18. ASMS score	.394**	.352**	.180	.154	-.098	-.041	-.296*	-.108	.207	.092	.270*	.098	.607**	-.332*	.385**	.221	.264						
19. CFs	.342*	.368**	.188	.088	.120	.003	-.148	-.105	.057	.089	.207	.083	.475**	-.296*	.269*	.240	.269*	.882**					
20. SCs	.415**	.354**	.328*	.244	-.158	-.167	-.374**	-.189	.286*	.091	.344*	.201	.363**	-.403**	.166	.034	.007	.761**	.562**				
21. INCOM score	.117	-.005	.033	--.123	.040	.173	-.296*	.127	.286*	-.042	.200	-.181	-.325*	.106	.032	.187	.063	.222	.165	.188			
22. OSs	.024	-.147	-.246	-.127	.070	.177	-.086	.234	.073	-.137	.045	-.226	.306*	-.153	.043	.108	.112	.260	.214	.150	287*		
23. ASs	.104	-.060	-.235	-.099	.065	.207	-.249	.160	.233	-.086	.203	-.204	.410**	-.039	.053	.215	.129	.338*	.241	.193	.801**	.777**	

N = 55; RT – Reaction Time; *d'* – Sensitivity Index; C – Decision Bias; BaSIQS – Basic Scale on Insomnia and Quality of Sleep; ASMS -Addiction to Social Media Scale; CFs – Compulsive Feelings score; SCs – Social Consequences score; INCOM – Social Comparison Orientation Scale; OSs – Opinion Subscale score; ASs - Attitudes Subscale score

** $p <= .01$; * $p < .05$