Effectiveness of a new Scout-based program on working memory in social media addicted individuals: A case report

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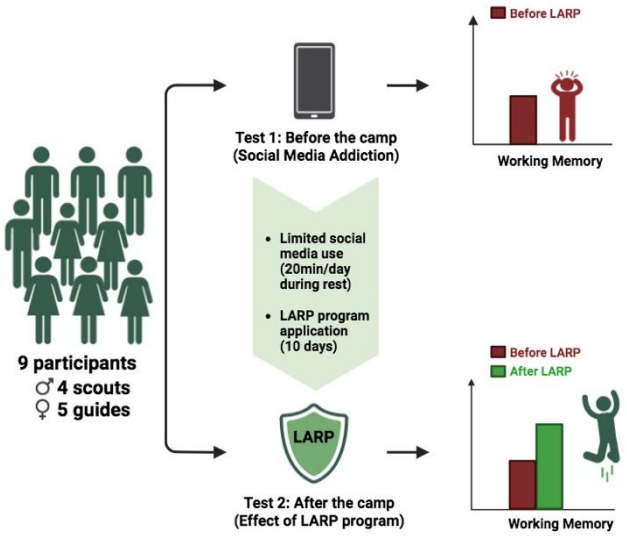
Abstract. Daily engagement with social networks can lead to addiction, contributing to deteriorating psychological health and impairments in neurocognitive functions, particularly affecting working memory and perception. These issues are associated with decreased academic performance among adolescents and young adults. This study aims to investigate the effectiveness of a non-drug remediation method on enhancing working memory and perception in adolescents. The research is conducted during a summer camp organized by the Moroccan Hassania Scouting, Kenitra branch, involving nine adolescents. Four boys and five girls were randomly selected from a pool of 50 participants. We used the digital Rey-Osterrieth complex figure test, the facebook addiction test, the nomophobia test, and a questionnaire. Additionally, we implemented our own remediation model, LAR-P, inspired by the Scout Method but adapted for our 10-day camping program. Our results demonstrate a significant improvement in working memory, as indicated by enhanced scores on the FCR-A test before and after the program. This non-drug remediation method, employing our LAR-P program, draws on the "learning by doing" principle, validating its efficacy in enhancing neurocognitive skills and performance.

***Keywords*-- Scouts; Addiction; Working Memory; Perception; Adolescents.**

Graphical Abstract



1 Introduction

Social networks are a new way of life and transition to the information age, in which we live now playing an increasingly important role communication tool through advances in technology. As the building block of a new virtual world, geopolitical constraints are eclipsed by three core elements: communication devices (mobile phones, notebooks and tablets, the first being also the most widespread across countries), internet as common network to connect every spot around the globe and social media platforms themselves that provide spaces for human relations. In our investigation, however, we mostly center on Facebook as it is the most popular social network in Morocco (25,464,300 users as of July 2023; representing 65.8% of the total population) [1].

In terms of support from family, these three factors enhance users' attachment, especially for teenagers who are in a process of seeking satisfaction and thus their needs. Individuals experiencing higher psychological distress or low self-esteem are more likely to drift toward social media addiction (SMA) and problematic Facebook use to meet unmet emotional or social needs [2]. For adolescents and young adults, social media serves as a major space for self-expression and peer interaction, often leading to extensive daily use that can gradually develop into addictive behavior with measurable impacts on cognitive functions and mental health. Excessive social media use has also been linked to more frequent and severe memory difficulties [3]. In line with this evidence, the aim of our research is to contribute to the prevention or reduction of SMA and the associated impairment of working memory.

Our study addresses this challenge by validating a non-drug intervention based on paradigms from the

Scout method, in particular learning by doing [4], to counteract the adverse impact of SMA and by assessing its effectiveness.

2 Proposed Method

A sample composed of nine adolescents boys and girls (four boys and five girls), was randomly taken from a camp organized by the Moroccan Hassania Scouting, branch Kenitra with an average age of 12.89 years ±0.78). Subjects were classified according to scouting standard, by which boys and girls are called scouts and guides respectively during their prospective scout years. Members of both groups were in green uniforms (Figure 1).

3 Procedure

Our working method is illustrated in figure 1. We collaborated with the scout delegate of the Moroccan Hassania Scouting, Kenitra branch, to implement a camp program centered around our remediation method, inspired by the scout approach. The delegate granted us permission to develop a schedule of camping activities and conduct surveys and tests before and after the 10-day long remediation program.

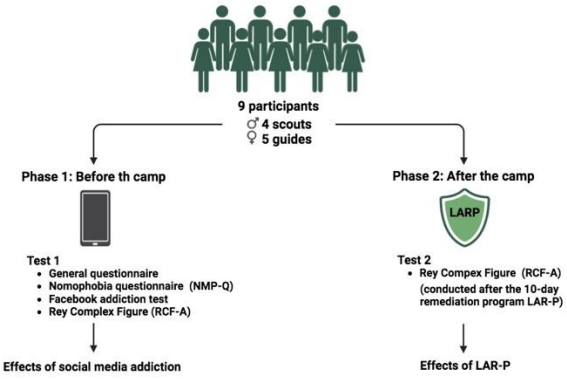


Fig 1: Overview of pre- and post-remediation program tests to assess working memory and perception in social media addictive individuals.

4 Material

4.1 General questionnaire

In this study, we have designed a comprehensive questionnaire aimed at identifying factors influencing young people and driving them towards SMA. These variables are critical for accurately assessing and diagnosing this behavioral addiction, which is closely associated with dependence on social media and other

tools that foster engagement with popular platforms in Morocco.

4.2 Nomophobia Questionaire test (NMP-Q)

The No Mobile Phone Phobia Questionnaire (NMP-Q) was originally developed and validated in a psychometric study focusing on nomophobia [5]. It comprises 20 items, with the first nine addressing situations involving the presence of a smartphone, and items 10 to 20 focusing on situations involving its absence. Responses are subject to the Likert scale of 1 (strongly disagree) and from 2 to 7 (strongly agree). NMP-Q scores on four different levels (absent/mild/moderate/severe) are possible, varying from 20 to 140 points. We used the questionnaire in Arabic as it was validated previously by Louragli et al. [6].

4.3 Facebook addiction test

The Bergen Facebook Addiction Scale (BFAS) was originally constructed and validated by Andreassen et al. [7], for measures the Facebook addiction. We used a six-item version assessing all six core components of addiction (knowledge, salience, mood change, tolerance, withdrawal, conflict, and relapse). For each item, participants indicated how frequently on a Likert-type 1–5 scale (from “very rare” to “very often”) they committed the behavior described. The possible scores on the BFAS range from 6 to 30. Those scoring 3 or more on four of the six items are labeled addicted to Facebook. We applied a validated Arabic version of this test Louragli et al. [8].

4.4 The digital Rey complex figure test type "A" (RCF-A)

The Rey Complex Figure Test (RCF) is a clinical neuropsychological test of perception, working memory and executive functions. This task was first developed by Rey (1941) and standardized by Osterrieth (1944) with a subsequent digital adaptation described by Wallon and Mesmin [9]. This digital test is composed of a digital pen (Anoto DP-201) and unique screen paper embedded with an infrared camera to record and store drawings. ELIAN software The captured data is processed with the Expert Line Information Analyzer (ELIAN). In our study we applied type A of the complex figure test (RCF-A, for persons from 6 years and upwards). This figure is composed of 18 items, which are scored according to predetermined criteria from 0 to 4, with a maximum score of 72.

4.5 The remediation program LAR-P (Louragli & Abdellah Remediation Program)

Our intervention LAR-P targets the cognitive part by a fundamental principle of Scouting – learning-by-doing. This is an important aspect for de-valuing participants from the virtual environment media, that tends to lead for SMA by its interaction and communication interface. The first step is to provide an environment that caters to the addictive nature of social-media junkies, encouraging communication in the real world in a group setting. Together with the scout leaders in charge of the camp, we designed a program based on three pillars: practicality, development of analytical thinking and group dynamic. We've called our camp this year a "A Scientific Camp". Other than the regular scout activities, we focus on scientific workshops. Every day, campers explore two scientific ideas with the use of models and experiments. Such themes are chosen in order to link theory and practice, so that participants bear out the lesson learned through training by identity among themselves, thus sharing a group competition that is both motivational and interactive. In addition to scientific training we have set up recreational art and recycling (reusing) projects in order to boost the creative ability and innovation of applicants, as well as sports, theater and music activities which form an integral part of our complete program. The organized nature of our program and the discipline of scouting sees to it that our schedule is a full one. Such stringent discipline leaves very little time for social media usage or smartphone whoopee, forbidden at any other time than stipulated short rest periods of no more than 20 minutes.

5 Results and Discussion

5.1 Results

5.1.1. Descriptive statistics

The study group (Table 1) consists entirely of middle school students with an average age of 12.89 years (± 0.78). Regarding gender, we have nearly equal numbers. The results indicate that students spend an average of 3.22 hours (± 3.22) per day on smartphones and 2.83 hours (± 2.65) on Facebook. These scores are notably high compared to typical averages for this age group. However, for the first semester average, we found a value of 14.07 (± 2.89), which reflects a good academic performance by Moroccan standards.

5.1.2. Correlation Analysis

Table 2 presents the correlations between the two tests of the RCF-A before and after the camp, along with variables including Nomophobia tests, Facebook addiction, and participants' first semester averages. The results obtained are the following:

For the first test, we found a significant negative correlation between working memory and both the score ($r = -0.849^{**}$, $P < 0.05$) and the state ($r = -0.884^{**}$, $P < 0.05$) of the Nomophobia test. However, for the second test, we found significant positive correlations between the score of the first semester average and both working memory ($r = 0.790^{*}$, $P < 0.05$) and perception ($r = 0.711^{*}$, $P < 0.05$), as well as between perception and working memory ($r = 0.678^{*}$, $P < 0.05$). Additionally, we found a significant negative correlation between the Facebook addiction BFSA test score and working memory ($r = -0.767^{*}$, $P < 0.05$).

5.1.3. Effects of remediation program LARP on working memory and perception

According to the paired samples t-test results, we found a significant difference only for working memory between the two tests, confirming H1 (Figure 2). Therefore, there is a significant difference between the means of the two tests for working memory. However, for perception, we found a non-significant relationship ($P > 0.05$), accepting H0, indicating no significant difference between the means of the two tests for perception

Table 1: Study group characteristics and social media usage patterns

Descriptive Statistics		
Age	**Mean**	**12.89**
	SD	**.782**
Gender (N; %)	**Male**	**4 ; 44.4%**
	Female	**5 ; 55.6%**
Social level (N; %)	**well-off**	**1 ; 11.1%**
	average	**8 ; 88.9%**
	difficult	**0 ; 0%**
Study level: Middle school (N; %)	**First year**	**3 ; 33.3%**
	Second year	**2 ; 22.2%**
	Third year	**4 ; 44.4%**
Laptop usage (hrs/day)	**Mean**	**.833**
	SD	**1.41**
Smartphone usage (hrs/day)	**Mean**	**3.22**
	SD	**3.22**
Internet usage (hrs/day)	**Mean**	**3.03**
	SD	**3.30**
Facebook usage (hrs/day)	**Mean**	**2.83**
	SD	**2.65**
First Semester Average	**Mean**	**14.07**
	SD	**2.89**

Table 2: Between RCF-A Nomophobia, Addiction, and Average Correlation Tests, Facebook First Semester

	1	2	3	4	5	6	7	8	9
1. working memory test 1	**1**								

2. Perception test 1	**.657**	**1**							
3. First semester average	**.594**	**.301**	**1**						
4. Nomophobia score	**-.849****	**-.303**	**-.455**	**1**					
5. Nomophobia state	**-.884****	**-.331**	**-.702**	**.913****	**1**				
6. BFAS score	**-.218**	**-.109**	**-.407**	**.183**	**.219**	**1**			
7. BFAS state	**.000**	**.184**	**-.227**	**-.091**	**.050**	**.822****	**1**		
8. Working memory test 2	**.538**	**.252**	**.790***	**-.600**	**-.621**	**-.767***	**-.456**	**1**	
9. Perception test 2	**.573**	**.282**	**.711***	**-.458**	**-.706***	**-.525**	**-.557**	**.678***	**1**

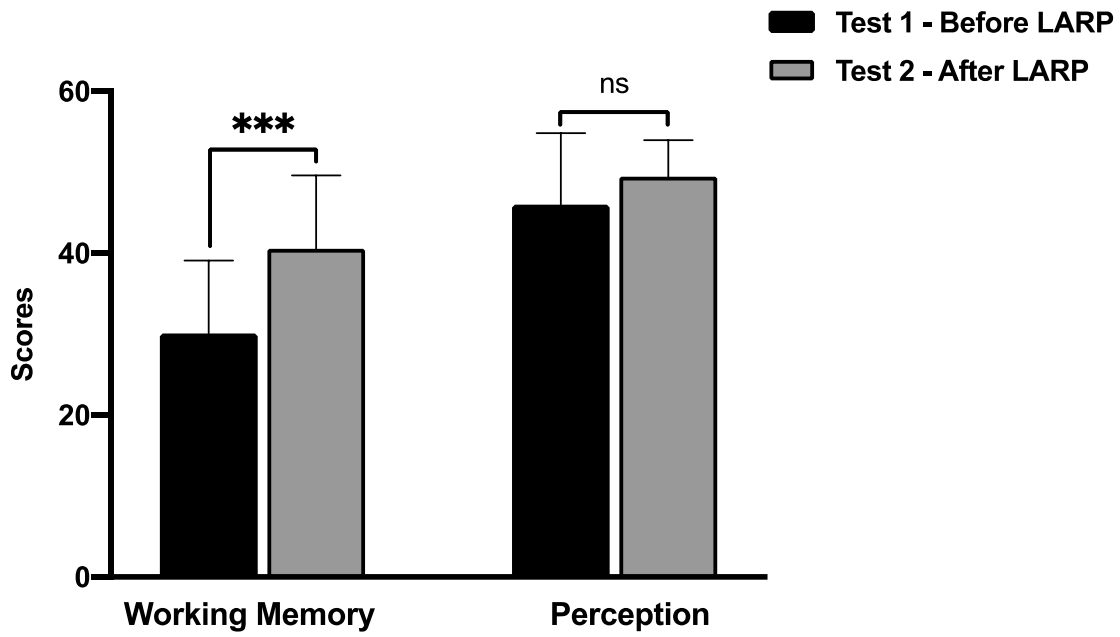


Fig2: Comparisons between working memory and perception pre- and post- remediation program.

6 Discussion

During this study, we evaluated our scout-based method for remediation of SMA, which affects working memory and promotes strong attachment to the virtual world, and we integrated our LARP method into the summer camp program where we worked with adolescent participants. We conducted the RCF-A test at the beginning and end of the camp. The results show a significant negative correlation between working memory in the first test and both the score and the state of the nomophobia test. Since the participants were on vacation before coming to the camp, it was a favorable time for unrestricted smartphone use without parental control, suggesting an influence of smartphone dependence on working memory. A study investigating the cognitive implications of cellphone use found a significant negative impact on working-memory performance among users [10]. In parallel, one study [11] identified identified a potential side effect of integrating smartphones into everyday life: the 'brain drain.' They demonstrated that the presence of smartphones near users can negatively impact two measures of cognitive capacity: available working memory capacity and functional fluid intelligence. In addition, for the second test, after the LAR-P remediation program, we found a significant negative correlation between the Facebook addiction BFAS test score and working memory, indicating a change in the evolution of working memory through our remediation method and a reduction in the influence of social media on memory. Furthermore, another study investigated structural brain alterations associated with SMA using the BFAS test, there is a negative association between amygdala gray matter volume and SMA score [12]. A previous study reported evidence of a link between amygdala activity and working memory has shown that besides its role in higher cognitive functions, the human

amygdala also plays a role in working memory [13]. Regarding academic performance, our results showed a significant positive correlation between working memory and perception with the score of the first semester average after the second test. Moreover, previous research conducted on Moroccan high school students reported a significant positive relationship between working memory abilities, visual perception, and overall academic performance [14]. The success of our remediation approach is consistent with the fact that the semester average score reflects student performance across the middle of a school year when, presumably, memory was activated and tuned for learning and calculations. We found that this score correlates positively with working memory in the second (i.e., post-camp) test, but not in the first (i.e., pre-camp) test. This indicates that students' participation on social networks is higher especially during holiday periods. Our results which were derived by averaging paired samples of working memory and perception between the first and second RCF tests indicate that working memory was significantly higher during the second test in relation to the first one. However, the perception scores did not differ significantly between the two examinations. Additionally, another study reported that the use of cognitive reconstruction and support methods in an intervention program in two phases as well. The participants were 28 students who were distributed into experimental and control groups. Results were established on the decrease in SMA, and betterment in mental health and academic performance among students. These findings imply a beneficial effect of cognitive restructuring and support strategies on SMA [15].

7 Conclusion

In conclusion, our remediation model by "LAR-P" with Scout method and focusing on the "learning by doing" attitude as well as cognitive restructuring has been effective. Real life engagement was achieved through excercise, scientific experiments, practises and recycling art activities including scouting as discipline system to engage in real life reduce virtual world attachment has improved memory and perception. The results of our camp program underscore the efficacy of our remediation method in increasing working memory. Therefore, multi-domain tasks and treatments must be involved for achieving a hopeful outcome.

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