Artículo original / Original Article

Exploring the link between smartphone social media use, performance and focus of table tennis players

Explorando la relación entre el uso de redes sociales en smartphones, el rendimiento y la concentración de los jugadores de tenis de mesa

Explorando a relação entre o uso de redes sociais em smartphones, o desempenho e o foco dos jogadores de tênis de mesa

Sol Rojas-Valverde[1]*, Carlos D. Gómez-Carmona[2,3,4], Aldo Vasquez-Bonilla[1,5], Braulio Sánchez-Ureña[1], Jorge Salas-Cabrera[1], Daniel Rojas-Valverde[1]

[1] Centro de Investigación, Desarrollo e Innovación en Salud y Deporte (CIDISAD), Escuela Ciencias del Movimiento Humano y Calidad de Vida (CIEMHCAVI), Universidad Nacional, Costa Rica
[2] Área de Educación Física y Deportiva, Departamento de Didáctica General y Didácticas Específicas, Universidad de Alicante, España
[3] Grupo de Investigación en Entrenamiento, Actividad Física y Rendimiento Deportivo (ENFYRED), Universidad de Zaragoza, España
[4] Grupo de Investigación en Optimización del Entrenamiento y el Rendimiento Deportivo (GOERD), Universidad de Extremadura, España
[5] Grupo en Avances en Entrenamiento Deportivo y Acondicionamiento Físico (GAEDAF), Universidad de Extremadura, España

*** Correspondence:** carlosdavid.gomez@ua.es

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Abstract

This study aimed to explore the immediate effects of smartphone-based social media use on table tennis performance variables, including reaction speed, stroke execution accuracy, and focus. A total of 14 young athletes, consisting of 7 males and 7 females (10.86 ± 1.83 years; 2.43 ± 0.65 years of experience in table tennis) participated in a randomized and counterbalanced quasi-experimental study divided into two groups: (a) social media group (SMG) and (b) table-tennis videos group (TTVG). The study assessed four variables: Stroop Test, reaction speed, a specific table tennis test, and focus (Toulouse-Piéron Test). The results indicated significant pre- and post-differences in hits, errors, and total points for both groups ($p < .01$), with no significant differences between groups in the three field tests. In conclusion, a 30-minute exposure to either game-related videos or social media stimuli in children led to improved scores, hits, and errors in the Stroop Test. These results suggest that acute exposure to virtual stimuli, regardless of type, enhances inhibitory control and attention abilities.

Keywords: Racquet Sports, Social Media, Smartphone, Internet Use Disorder, Mental Health, Screen Time, Technology Addiction.

Resumen

Este estudio tuvo como objetivo explorar los efectos inmediatos del uso de redes sociales en teléfonos inteligentes sobre variables de rendimiento en tenis de mesa como la velocidad de reacción, la precisión en la ejecución de golpes y la concentración. Un total de 14 jóvenes atletas, compuesto por 7 hombres y 7 mujeres (10.86 ± 1.83 años; 2.43 ± 0.65 años de experiencia en tenis de mesa) participaron en un estudio cuasi-experimental aleatorizado y contrabalanceado dividido en dos grupos: (a) grupo de redes sociales (GRS) y (b) grupo de videos de tenis de mesa (GVTM). El estudio evaluó cuatro variables: el Test de Stroop, la velocidad de reacción, una prueba específica de tenis de mesa y la concentración (Test de Toulouse-Piéron). Los resultados indicaron diferencias significativas pre y post en aciertos, errores y puntos totales para ambos grupos ($p < .01$), sin diferencias significativas entre grupos en las tres pruebas de campo. En conclusión, una exposición de 30 minutos a videos relacionados con el juego o estímulos de redes sociales en niños llevó a mejoras en las puntuaciones, aciertos y errores en el Test de Stroop. Estos resultados sugieren que la exposición aguda a estímulos virtuales, independientemente del tipo, mejora las habilidades de control inhibitorio y atención.

Palabras clave: Deportes de Raqueta, Medios de Comunicación Sociales, Teléfono Inteligente, Trastorno por Uso de Internet, Salud Mental, Tiempo de Pantalla, Adicción a la Tecnología.

Resumo

Este estudo teve como objetivo explorar os efeitos imediatos do uso de redes sociais em smartphones sobre variáveis de desempenho no tênis de mesa, como a velocidade de reação, a precisão na execução de golpes e o foco. Um total de 14 jovens atletas, composto por 7 homens e 7 mulheres (10,86 ± 1,83 anos; 2,43 ± 0,65 anos de experiência em tênis de mesa) participou de um estudo quase-experimental randomizado e contrabalançado dividido em dois grupos: (a) grupo de redes sociais (GRS) e (b) grupo de vídeos de tênis de mesa (GVTM). O estudo avaliou quatro variáveis: Teste de Stroop, velocidade de reação, um teste específico de tênis de mesa e foco (Teste de Toulouse-Piéron). Os resultados indicaram diferenças significativas pré e pós em acertos, erros e pontos totais para ambos os grupos (p< 0,01), sem diferenças significativas entre grupos nos três testes de campo. Em conclusão, uma exposição de 30 minutos a vídeos relacionados ao jogo ou estímulos de redes sociais em crianças levou a melhoras nas pontuações, acertos e erros no Teste de Stroop. Esses resultados sugerem que a exposição aguda a estímulos virtuais, independentemente do tipo, melhora as habilidades de controle inibitório e atenção. máximo)

Palavras chave: Esportes de Raquete, Mídias Sociais, Smartphone, Transtorno por Uso da Internet, Saúde Mental, Tempo de Tela, Dependência de Tecnologia.

Introduction

The use of technology in sports has spread exponentially to improve athletic performance, develop tools for achieving sports justice, enhance communication and marketing strategies, and provide ease and accessibility for assessing mental, physical, and physiological performance (Pino-Ortega & Rico-González, 2021; Pirker, 2020). Technologies such as wearable devices, smartphones, and cameras are examples of technological tools currently available and constantly evolving, which allow for the improvement of technical and physical capabilities, as well as a means of performance evaluation (Cardinale & Varley, 2017; Hernández-Beltrán et al., 2023; Li et al., 2016).

While the extensive availability of new technologies (e.g. smartphones, tablets, laptops) in sports can bring certain benefits, the negative impact on athletic and academic performance as a consequence of their use has also been explored (David et al., 2018; Lim, Donovan, Kaufman, & Ishida, 2020; Sanderson, 2018). The use of social media through smartphones has been shown as one of the factors that can acutely and chronically affect health (chronic sleep deprivation, decreased academic performance, socioemotional disturbances, cognitive control) (Abi-Jaoude, Naylor, & Pignatiello, 2020; Faustin, Burton, Callender, Watkins, & Chang, 2022; Kim, Wang, & Oh, 2016) and athletic performance (decreased multitasking abilities, problem-solving and decision-making skills, and decreased physical and technical capabilities) (Abi-Jaoude et al., 2020; Fortes et al., 2021; Gantois et al., 2020).

In the case of table tennis, athletic performance is considered multifactorial, with factors including technical efficiency (Le Mansec, Pageaux, Nordez, Dorel, & Jubeau, 2018; Le Mansec, Seve, & Jubeau, 2017), concentration and reaction time (Fabre, Martin, Borelli, Theurel, & Grélot, 2014), and timely, effective, and efficient decision-making and management of mental fatigue (Le Mansec et al., 2018). The scientific literature has increasingly recognized table tennis as a high-cognitive-demand sport, given that players must process visual stimuli at high speed, anticipate trajectories, and execute technically precise responses in fractions of a second (Fabre et al., 2014; Le Mansec et al., 2018). In this regard, studies have highlighted that perceptual-cognitive skills — such as visual anticipation, working memory, and attentional control — are as determinant of competitive performance as physical and technical preparation (Fernández-Cortés et al., 2024; Müller & Abernethy, 2012; Rodrigues et al., 2002). Furthermore, research has underscored the relevance of psychophysiological variables, including heart rate variability and cortical activation patterns, as indicators of competitive readiness and performance efficiency in elite players (Fabre et al., 2014).

Mental fatigue is defined as a psycho-biological state caused by prolonged and highly demanding cognitive tasks (Sun, Soh, Roslan, Wazir, & Soh, 2021), which could lead to impairments in decision-making and technical performance due to the alteration of executive functions (Pageaux & Lepers, 2018). In the context of table tennis, this is particularly significant since the sport requires sustained attention and rapid executive processing throughout the entirety of a match, making players especially vulnerable to the accumulating effects of cognitive load (Sun et al., 2021). This alteration not only leads to acute effects but also chronic effects that create an unstable environment and contribute to the athlete's susceptibility (Russell, Jenkins, Rynne, Halson, & Kelly, 2019). In this sense, a previous study suggested that this negative influence is greater for offensive actions than for defensive actions (Sun et al., 2021), which implies that the aspects of the game requiring the highest levels of initiative, anticipation, and rapid decision-making are the most sensitive to cognitive deterioration.

One of the recently studied factors that cause alterations in mental fatigue is the use of social media (Abi-Jaoude et al., 2020; Huang, 2022). Especially among athletes, the use of social media prior to training and competition can be critical for analyzing its negative effects on cognitive, physical, and technical performance (Hayes, Filo, Geurin, & Riot, 2020). In this sense, while evidence exists on the effect of social media use on athletic performance in disciplines such as swimming (Fortes et al., 2022), boxing (Fortes et al., 2021b), volleyball (Fortes et al., 2021a), American football (Lim et al., 2020), and soccer (Fortes et al., 2020; Gantois et al., 2020), there is no scientific basis for the study of these effects in table tennis players. Therefore, the purpose of this study was to analyze the acute effects of smartphone use on social media on athletic performance in table tennis players, focusing on reaction time, stroke execution precision, and concentration. It was hypothesized that (1) acute smartphone-based social media exposure would significantly impair reaction time compared to a neutral video-watching condition and a passive control condition; (2) stroke execution precision would be significantly reduced following social media use relative to both comparison conditions; and (3) concentration levels would be significantly lower after social media exposure compared to the neutral video and control conditions, consistent with the pattern of cognitive impairment reported in adult athletes across other sports.

Materials and Methods

Design

This quantitative quasi-experimental study employed a randomized, parallel, counterbalanced design (Ibáñez & Feu, 2026). Fourteen participants, with equal gender distribution, were included in the study and were randomly assigned to either the social media group (SMG) or the sports video group (TTVG). The participants were assessed before and after each experimental condition using the Stroop test. Between stimuli, 72 hours of rest were provided. After each experimental condition, the following three variables were evaluated: reaction speed, hit accuracy, and concentration. The design was based on previous studies (Fortes et al., 2020) and is presented as follows (see Figure 1).

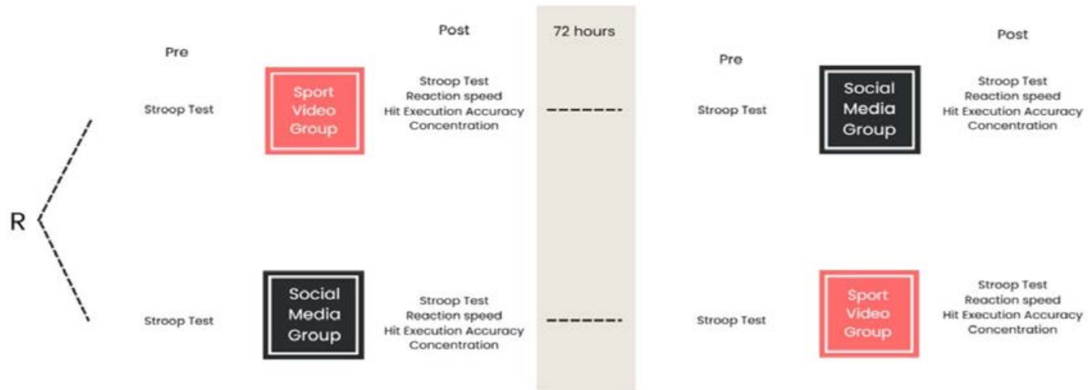

Figure 1. Study design.

The study variables were designed as follows, where (O) assessment (reaction speed, shot precision and focus), (X_1) social media group and (X_2) table tennis videos group:

$$R\frac{\mathrm{E1}}{\mathrm{E2}}\frac{X_1\mathrm{O}}{X_2\mathrm{O}}$$

Participants

Fourteen national-level table tennis players (seven males and seven females) were recruited for the current study. The participants' mean age was 10.86 ± 1.83 years, mean weight was 36.92 ± 9.29 kg, mean height was 1.50 ± 0.12 m, and mean sports experience was 2.43 ± 0.65 years. Participants were divided into two groups: (a) a social media group (SMG) and (b) a table tennis video group (TTVG). The selection criteria included regular table tennis training at least three times a week in the past three months, a minimum of two years of sports experience in this discipline, and the absence of health or injury conditions that prevent regular play. All participants were in a competitive phase.

The sample size was estimated based on a counterbalanced experimental study to reduce progressive error and distribute it equally between the experimental conditions (Johnson, 2010). This calculation was performed using the G-Power software for repeated-measures MANOVA between factors. The resulting sample size was 12 participants across two groups, with an effect size of F = 0.5 and a 1-beta probability of error of 0.95.

This protocol was evaluated by the Scientific Ethics Committee of the University (UNA-CECUNA-0185-2022) in accordance with the guidelines of the Country Research Law No. 9234. The protocol was conducted in accordance with the biomedical research guidelines set out in the Helsinki Declaration. Due to the participation of minors, an informed consent form was signed by the participants, legal guardians, and researchers.

Instruments and procedures

Before the evaluation sessions, participants were asked to avoid using smartphones and social media for at least two hours before data collection (Fortes et al., 2021b). Participants assigned to the SMG group used their smartphones for 30 minutes prior to the assessments (e.g., TikTok or Instagram). Meanwhile, the TTVG group watched 30 minutes of professional table tennis games on a wall-mounted projector. These conditions were similar to those used in previous studies (Fortes et al., 2021b, 2022). After exposing the table tennis players to the stimuli, three tests were conducted to assess the different technical skills related to game performance.

Stroop test: A neuropsychological test used to evaluate an individual's ability to ignore irrelevant stimuli and focus on relevant ones. Therefore, this test evaluates the ability to inhibit the cognitive interference that occurs when processing a specific feature of the stimulus, which hinders the simultaneous processing of a second attribute of the stimulus (Stroop, 1935), which is known as the Stroop effect (Scarpina & Tagini, 2017).

The task involved reading words written in different colors, but the words themselves may conflict with the colors of the letters. For example, the word "red" could be written in green. The goal of the test is to determine how long a participant takes and how many errors they make when trying to ignore irrelevant information (the meaning of the word) and respond to relevant information (the color of the word). During this test, the susceptibility to interference from conflicting stimuli was assessed (i.e., how the brain handles contradictory information and how it selects relevant information to perform a task) (Sibley, Etnier, & Masurier, 2006).

This test was conducted using a mobile application called the Stroop Effect (iOS 9.0, Attila Hegedüs, Hungary). The mobile application displays a label centered at the top of the screen in either green or red, with the word "green" or "red," and two labels in the bottom-left and bottom-right corners, respectively, in the same way. The task involves selecting the appropriate label from the bottom, whose text indicates the color of the upper label. Errors, correct responses, and total scores were recorded in this test.

NeuroPhys Sports Reaction Test: Reaction speed was evaluated using the NeuroPhys Sports Reaction Test, which employs a wireless light system (Fitlight Trainer, Miami, Florida, USA). The test was modified to be performed with the hand in the bipedal position in front of a table tennis with short displacement, simulating specific sports movements. The protocol consists of five lights arranged in a semicircle on the official game table (Pro-9, Champion, Seoul, Korea). The lights were placed at each 45° intersection (see Figure 2). Participants were instructed to start by placing their hands with the racket at the starting point (described as 0 in Figure 2). After a signal from the researcher, the test begins, and the lights turn on randomly for 30 seconds until participants turn them off one by one, passing the racket through an invisible light beam with a height range of 80 cm. Once a light is turned off, another one immediately turns on. The test consisted of 2 series of 30 seconds. The test required participants to turn off the lights as quickly as possible. The variables hit counts (lights turned off, n) and speed reaction average at each light (ms) were analyzed for each participant.

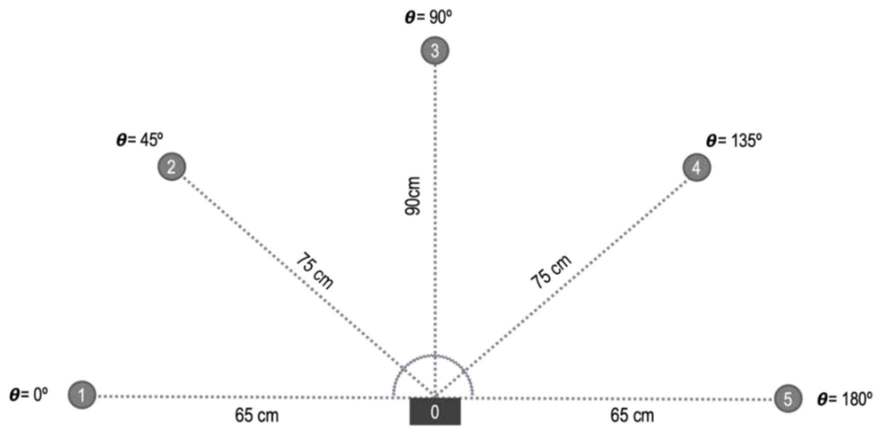

Figure 2. Disposition of NeuroPhys Sports Reaction Test for table tennis in the present study.

Specific Table Tennis Test: To perform this test, a robot (Robo-Pong 540, Newgy Industries, Hendersonville, Tennessee, USA) was used, which sends balls at programmable frequency and speed. In this test, the participant performed a series of strokes for 30 seconds, trying to place the ball on a specific area on the opposite side of the table, where each demarcated zone corresponded to a score of 8, 6, 4, or 2 points (see Figure 3). No score is assigned to balls that are off the table or missed.

During the study, the robot was programmed to send balls without spin or oscillation at a frequency of one ball every two seconds, which is related to the average hit frequency in high-performance table tennis (Zagatto, Morel, & Gobatto, 2010). Each player selected the location of their piece on the table to represent a real-game situation. Before starting the test, each player performed a 20-minute general and specific warm-up. The values were presented as a percentage (%) of balls in each zone.

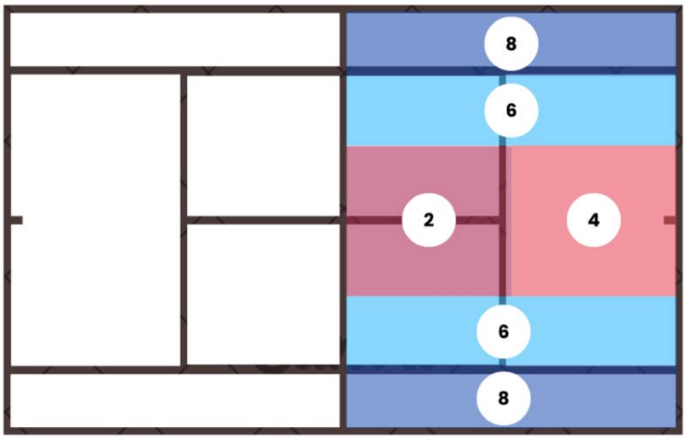

Figure 3. Distribution of score zones for the specific table tennis test.

Test de Toulouse-Piéron: This test evaluates the identification in the shortest time possible (<20 seconds) of specific figures previously given from a group of figures (see Figure 4) (Gómez & Morales, 2006). Each test series includes an accumulation phase (20 seconds of Burpee), followed by a concentration phase (until the figure is located or 20 seconds of the Toulouse-Piéron test are exceeded). This series is repeated continuously, without rest, until the athlete reaches fatigue. The figure for the concentration phase varies across series. The number of completed series (n), the number of accumulation phases (n), concentration phases (s), and the perception of effort (arbitrary units, a.u.) were recorded.

After each accumulation phase, the participant's perceived effort was assessed using the Borg scale. The perceived effort (RPE) was recorded as a marker of the effort of fatigue. This variable indicates the subjective effort experienced by the athlete during and after exertion. Participants were familiar with the use of RPE and were evaluated using the Borg Scale 0-10, where 0 was defined as a "very, very light" effort and 10 as a "maximum, strenuous" effort (Shariat et al., 2018).

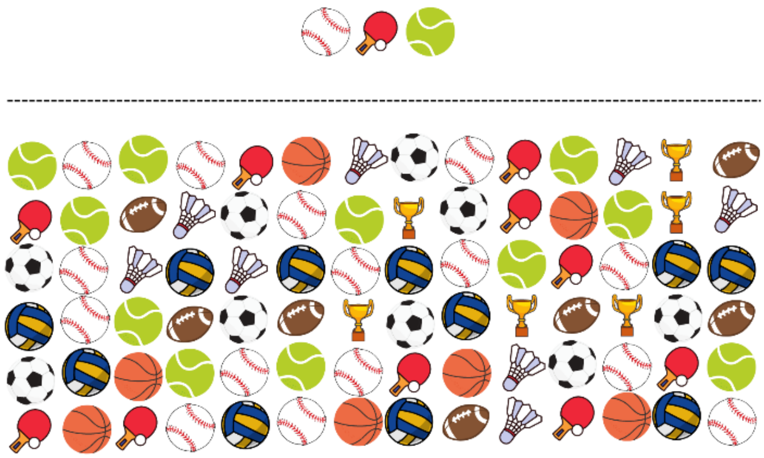

Figure 4. Example of focus phase in Toulouse-Piéron test.

Statistical analysis

Firstly, descriptive statistics of each variable were obtained by the mean and standard deviation (*M* ± *SD*). Then, the data distribution was analyzed using the Shapiro-Wilk test and Levene's test, which confirmed the data's normality and homogeneity of variance. For the Stroop Test variables, the delta of change was calculated, and a two-way analysis of variance (ANOVA) was performed to explore potential differences in means between groups' measurements (groups x time of measurement). In the reaction speed and concentration tests, differences between groups in variable results were explored using a one-way ANOVA (groups). Regarding the specific table tennis test, the results were analyzed using a two-way ANOVA, comparing groups within each of the five score categories (groups x score). The magnitude of the difference was estimated using partial omega squared (ω_p^2) for F, using the following thresholds: <0.01 trivial, >0.01 low, >0.06 moderate, and >0.14 high (Cohen, 1988). Significance was previously established at $p<0.05$. Data were analyzed using the Statistical Package for Social Science for Windows (version 22, IBM Corporation, Armonk, New York, USA).

Results

Stroop Test

The effects of groups, measurement time, and their interaction on the Stroop Test are shown in Figure 5. Statistical differences were found between the time of measurement (pre vs post; $p< .01$) in the three analyzed variables: (a) correct responses (ω_p^2= 0.4, high effect; post > pre); (b) incorrect responses (ω_p^2= 0.1, moderate effect; pre > post); and (c) total score (ω_p^2= 0.4, high effect; post > pre). No differences were found between groups (SMG vs TTVG).

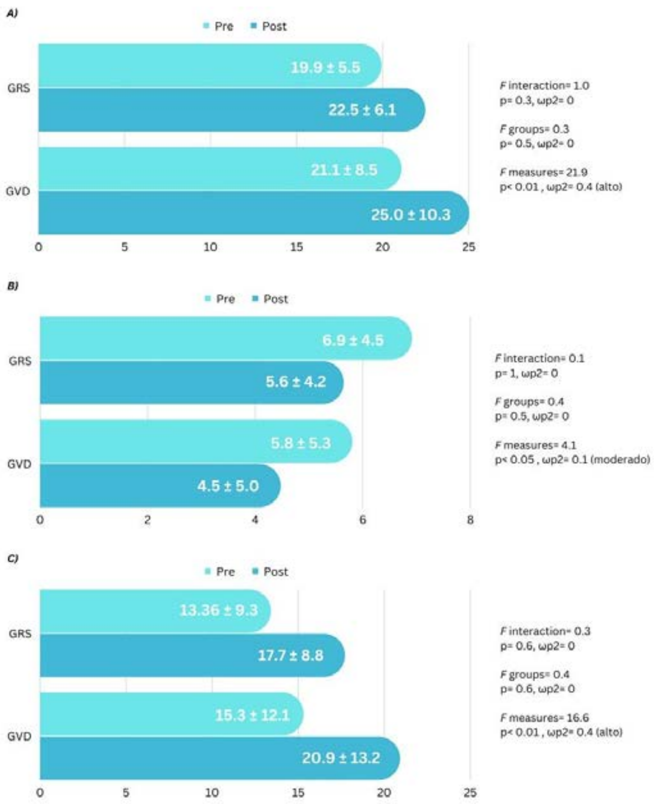

Figure 5. Differences between stimuli and time of measurement in Stroop Test variables: (a) correct responses; (b) incorrect responses; and (c) total score.

Speed reaction test and Toulouse-Piéron test

Table 1 shows the statistical analysis comparing the SMG and TTVG groups for total number of hits and reaction speed during the speed reaction test, and for the number of series performed, accumulation phases, focus phase, and rate of perceived exertion during the Toulouse-Piéroxn test. In the speed reaction test, no differences were found between the total number of hits and reaction speed between groups (SMG vs TTVG). As such, no differences were found between groups in the series performed, accumulation phases, focus phase, and rate of perceived exertion in the Toulouse-Piéron test.

Table 1. Statistical differences between SMG and TTVG groups in speed reaction test and Toulouse-Piéron test.

	SMG	TTVG	F	p	ω_p^2
Speed reaction test					
Total number of hits (n)	21.2±2.7	20.4±2.7	0.6	0.4	0
Speed reaction (ms)	0.6±0.1	0.7±0.1	1.9	0.2	0
Toulouse-Piéron test					
Total series (n)	9.2±1.2	9.0±1.9	0.1	0.8	0
Accumulation phases (n)	6.7±1.1	6.6±1.2	0.1	0.8	0
Focus phase (s)	5.9±1.3	5.8±1.3	0.1	0.8	0
Rated of perceived exertion (a.u.)	8.5±1.8	8.3±2.2	0.1	0.8	0

Specific table tennis test

Figure 6 shows the scores obtained in a specific table tennis test in SMG and TTVG groups. Statistical differences were not found in the percentage of points per zone in between groups comparison. Instead, differences were found between the score zones (ω_p^2= 0.8, high effect; 8 points > 6 points > 0 points > 2 points > 4 points)

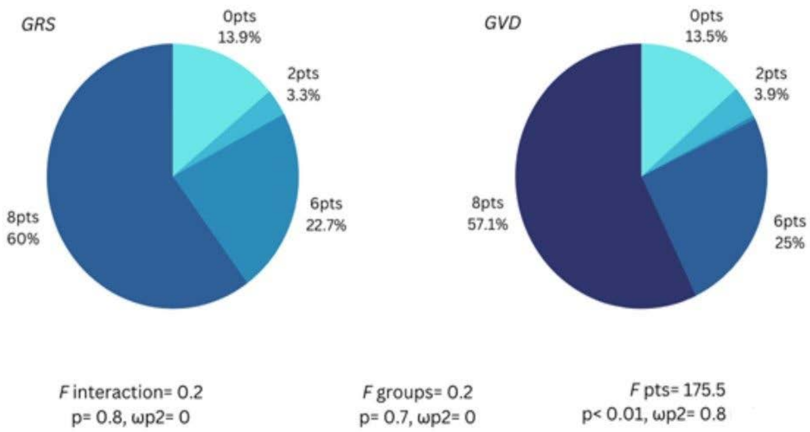

Figure 6. Score zones in SMG vs TTVG during a specific table tennis test.

Discussion

The present study aimed to analyze the acute effect of smartphone-based social media use on the athletic performance of table tennis players, specifically regarding reaction speed, stroke execution accuracy, and focus. The results indicated that exposure to social media prior to performance testing impaired reaction speed and stroke accuracy, while focus showed a moderate but non-significant decline. These findings are consistent with previous research conducted in other sports contexts, where social media use was associated with impairments in decision-making and performance outcomes. For instance, studies in swimming, boxing, soccer, and volleyball reported that acute social media exposure negatively affected athletic performance by increasing mental fatigue and reducing executive function capacity (Fortes et al., 2021a, 2021b, 2022; Gantois et al., 2020). However, the present study extends this evidence to table tennis, a sport characterized by particularly high perceptual-cognitive demands, where reaction speed and attentional control are critical determinants of competitive success (Le Mansec et al., 2018; Fabre et al., 2014). In this sense, the magnitude of the impairment observed in table tennis players may reflect the sport's greater reliance on rapid visuomotor processing and decision-making under time pressure, compared to sports with slower or more predictable stimulus-response cycles. Furthermore, unlike prior studies that focused predominantly on adult amateur and professional populations (Fortes et al., 2021b; Gantois et al., 2020), the present study contributes novel evidence by including young players, a population in which the neurological and attentional systems are still developing and may therefore be more susceptible to the disruptive effects of social media on cognitive performance (Abi-Jaoude et al., 2020).

Previous evidence suggests that the use of social media for 30 minutes before training may compromise athletic performance in adult athletes, concerning decision-making (Fortes et al., 2020; Gantois et al., 2020), focus (Fortes et al., 2021b), and endurance (Fortes et al., 2022) as a response to mental fatigue. Mental fatigue has been evaluated using the Stroop test, which assesses inhibitory control (e.g., the ability to delay or stop an automated cognitive response) and selective attention, two factors considered components of cognitive function. In contrast, the results of this study indicate that 30 minutes of exposure to social media or sports videos in children results in improvements in scores, hits, and errors on the Stroop Test. This indicates that acute exposure to virtual stimuli, regardless of type, potentiates inhibitory control and attentional ability.

This difference in inhibitory response between children and adults has been reported previously and is influenced by factors such as reading ability and emotion. The ability to inhibit behavior depends on prior learning and experience and this can define the differentiated response between age populations. This inhibition can be behavioral (e.g., executive or motivational) or automatic (e.g., attention) (Nigg, 2000) and the ability to control impulses is achieved at around 10-12 years old (Welsh et al., 1991). It is suggested that the ability to suppress automatic response and discriminate irrelevant information is lost with age (Augustinova et al., 2018). Based on the above, there may be differences between adults and children in potential factors that improve inhibitory capacity, and further research is needed to investigate whether acute exposure to social media can stimulate this attentional capacity in children.

The findings of this study suggest that further analysis is necessary to determine if 30 minutes of exposure to social media or other virtual stimuli causes mental fatigue in children, as has been shown in adults. The difference in response to this type of virtual stimuli may be due to children growing up in a world centered around social media and technology (Badri et al., 2017; Turner et al., 2017). Mental fatigue in adults has been linked to decreases in dopamine (Gurvich & Rossell, 2015), which compromises inhibitory control (Lorist et al., 2005). However, exposure to social media in children has been found to release oxytocin and dopamine, which can cause long-term cognitive changes depending on the duration of exposure (Maza et al., 2023). Although the benefits of acute exposure to social media remain unknown, virtual scenarios have been shown to promote attention, interest, and motivation (Acosta-Medina et al., 2021), which could impact inhibitory control by behavior. Furthermore, research has demonstrated that intrinsic and identified motivation positively correlates with training intensity and self-perceived performance in youth athletes (Sáenz-López et al., 2025), suggesting that motivational factors induced by engaging stimuli could influence both cognitive and physical performance outcomes. Therefore, the relationship between cognitive function and social media use in children requires further investigation (Plowman et al., 2010), considering the potential problems, challenges, and opportunities for athletic performance.

The results of this study suggest that there were no significant differences in concentration, accuracy, or reaction time between the groups. However, exposure to stimulating virtual environments, such as social media and sports videos, may have influenced this response. Reaction time is a critical ability in table tennis, as it evaluates the time between a sensory stimulus and the subsequent response, which is necessary to anticipate the direction and speed of the ball (Ak & Koçak, 2010). Since the ball travels at high speeds and covers short distances in table tennis, minimal time is required to react and execute shots accurately (Bhabhor et al., 2013). Reaction time has three components: perceptual, decision-making, and motor execution time. Nonetheless, exposure to virtual environments has been suggested not to compromise reaction time (Smith & Burd, 2019). Therefore, the acute use of social media or sports video viewing is unlikely to alter athletic and cognitive abilities. Moreover, digital visual stimuli may enhance the perception necessary for adequate reaction time by improving haptic perception through observation (Robles-De-La-Torre, 2008).

Finally, hand-eye coordination is a crucial aspect of table tennis, requiring players to concentrate on discerning different scenarios and placing the ball precisely at the desired location (Rodrigues et al., 2002). In the current study, no significant differences were observed in technical or precision ability, or concentration capacity. However, research has shown that virtual environments can enhance the accuracy and precision of manual tasks (Martirosov et al., 2021). Despite this, there is a lack of scientific evidence regarding how social media or sports video use may affect technical gestures, precision, and accuracy, underscoring the need for further analysis.

Although the present study is the first to evaluate the effects of social media on concentration and athletic performance in young table tennis players, it has several limitations that must be described. Firstly, the sample size may not have been large enough to yield statistically significant results, given that cognitive variables can vary widely across populations. It is important to note that children and adults differ in their maturation, cognition, and physical-technical abilities, which could affect the study's results. While there is evidence in adults, it may not be sufficient to fully explain the findings in children. Moreover, the relatively high variability in the sample could introduce bias, making it difficult to draw significant conclusions. These differences could be attributed to the maturation differences between the age groups studied. Finally, the lack of a control group not exposed to virtual environments could affect the interpretation of the results.

Conclusions

The results of the present study showed a pre-post improvement in inhibitory control and attention following both 30-minute exposure conditions, smartphone-based social media use and sports video watching, in youth table tennis players. Rather than attributing these changes to a specific effect of either stimulus type, the observed improvements should be interpreted cautiously, given the absence of a true passive control condition in the current design, which precludes ruling out alternative explanations such as practice effects, natural fluctuations in arousal, or test-retest familiarity with the performance measures. Nevertheless, the findings suggest that both technology-based conditions may provide cognitively engaging stimuli that do not appear to impair and may, in some instances, be associated with modest improvements in inhibitory control and attentional performance in this population. These preliminary observations have potential implications for athletes and coaches, as they suggest that technology-based activities commonly practiced by youth players in pre-competition or pre-training contexts may not uniformly impair cognitive readiness. Future studies incorporating a true passive rest control group, randomized crossover designs, and larger samples are needed to confirm whether these associations reflect genuine causal effects and to determine the conditions under which technology use may benefit or hinder athletic performance in young table tennis players.

Practical Applications

The results of this study suggest several practical applications for youth table tennis players and their coaches. Contrary to concerns about the negative effects of technology use, a 30-minute exposure to either social media or sports-related video content may actually improve inhibitory control and attention in young athletes. This could potentially enhance their sports performance and focus. Coaches could consider incorporating short, controlled technology-based interventions into pre-training or pre-competition routines to potentially boost cognitive abilities. However, it's important to note that these effects were observed in youth players and may differ for adult athletes. Additionally, although no negative effects were observed on reaction time, technical precision, or concentration, further research is needed to fully understand the long-term effects. Coaches and athletes should therefore approach technology use strategically, considering both its potential benefits for cognitive stimulation and the need for balanced, sport-specific preparation.

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