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Communication Style as a Modulator of Engagement and Success in Game-Based Interventions for Older Adults: Non-Randomised Experimental Study

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Abstract

Purpose of the Study: This study examines how older adults respond to two different communication styles during an analogue game, focusing on both mood changes and game outcomes. **Methodology:** A non-randomised experimental study compared two different communicative styles while using a game-based approach (Agilidades Inc.) in older adults: Group 1 (G1-humanistic communication) (n = 18); Group 2 (G2-straight communication) (n = 10). The visual analogue mood scale (VAMS) was assessed before and after the game. The % of game success was calculated. **Findings:** VMAS scores were modified for: valence (p = 0.016), mood (p = 0.020) (G1); for arousal (p = 0.034), valence (p = 0.046) (G2). Group 2 presented a significantly higher % of game success (p = 0.013). There is a high correlation between % success and arousal T1-T0 (p = 0.015) in G2. **Conclusion:** Communication style significantly influences both emotional response and game-related success in older adults. Humanized communication fosters greater emotional well-being, while straightforward communication may enhance task performance by improving clarity.

Keywords

Communication, Games, Therapy, Older Adults, Ageing

1. Introduction

The global population is aging rapidly, with individuals aged 65 and over pro-

jected to make up 16% of the world's population by 2050, up from 9% in 2020 [1]. In Europe, this demographic shift is even more pronounced, with forecasts indicating that nearly 30% of the population will be aged 65 or older by mid-century [2]. This trend underscores the urgent need for integrated strategies that not only support health and well-being in later life, but also foster lifelong learning and active engagement in society.

To address this new demographic reality, some adaptations in health services are essential [2] [3]. As individuals age, they may face changes and limitations associated with the ageing process, which often lack the necessary resources to facilitate daily activities for older adult people [4]. These changes can heighten the risk of cognitive decline in older people, leading to negative impacts on quality of life and the ability to carry out daily activities, which in turn results in increased dependence and a loss of well-being [5]. Declining health in older adults, particularly in the form of cognitive and functional impairments, can significantly hinder learning capacity and autonomy, making it vital to promote integrated approaches that support both health and educational engagement [6]. Ensuring conditions for positive learning experiences throughout life therefore requires not only educational opportunities, but also strategies to maintain and promote physical and cognitive health in aging populations [7].

Based on a "comprehensive approach" to ageing, active ageing should be widely preventative and inclusive, encompassing people throughout their entire lives and including them regardless of their physical, psychological, or social condition [8]. Additionally, it has been observed that ageing and living independently promote a sense of identity and well-being in older adults, as well as a feeling of belonging to the community [9]. In this regard, some studies suggest that social interactions based on communication can help reduce issues related to socialization [10]. Research also indicates that communication plays a key role in successful ageing and proposes that social service organizations could support the ageing process by implementing communication practices that enhance individual effectiveness [11] [12].

The development of adequate communication skills in social settings, where people are an essential part of the process, is crucial. For example, in the educational field, research has indicated that teachers' messages influence students' engagement [13], motivation to learn [14], anxiety levels [15], and academic performance [14]. These studies often examine the consequences of negatively oriented communicative approaches, while the exploration of positive outcomes resulting from well-targeted messages receives comparatively less attention. In the healthcare context, the development of communication skills is an essential requirement to ensure efficiency in health services [16]. The related concepts of empathy, compassion and person-centred communication in healthcare have been shown to influence the quality of care positively, patient experience and outcomes, as well as provider satisfaction and resilience to stress and burnout [17]. For instance, research has highlighted the prevalence of patronizing speech, known as "elderspeak", in interactions with older adults, which can lead to negative percep-

tions and reduced quality of communication [18]. Conversely, studies have shown that effective communication strategies, such as avoiding ageist language and promoting age-inclusive communication, can enhance interactions with older adults [19].

The diverse range of healthcare experiences in aging encompasses various interventions; among them, the use of games stands out as a comprehensive tool that addresses multiple health domains. Studies have demonstrated that such interventions can effectively increase functioning and activity levels in older adults residing in long-term care facilities [20], highlighting their potential as a multifaceted approach to healthy aging [21].

In specific, digital and analogue game-based interventions have been shown to enhance cognitive functions, motor skills, and emotional well-being, contributing to a more active and independent lifestyle [22] [23]. Furthermore, these interventions can foster the acquisition of new skills, which not only support personal growth and adaptability but also serve as a key enabler for sustaining autonomy and engagement in daily life [24]. Moreover, serious games and exergames have demonstrated benefits in fall prevention, rehabilitation, and overall quality of life in aging populations [25] [26]. In summary, game-based interventions have been shown to enhance learning in cognitive functions, physical abilities, and foster social engagement among older adults [25].

Their interactive and enjoyable nature makes them appealing to both healthcare professionals and end-users, facilitating adherence and positive outcomes [27]. However, to maximize their effectiveness in learning motor/cognitive skills, it is essential to discuss and establish evidence-based protocols and methodologies for the daily integration of game-based practices, both as a preventive strategy and as a means of promoting health and well-being in later life [28] [29], including specific orientations for communication styles and instructions.

Globally, research on the impact of communicative styles remains limited, with existing studies predominantly situated within educational settings and focusing on formal communication contexts involving adolescents and young adults. However, comprehensive investigations into the benefits of positive communicative styles across various age groups remain scarce. To our knowledge, no previous studies have analyzed the impact of communicative styles in the application of game-based therapy strategies with older people. Communication could be more effective when it promotes positive mood states, such as joy, interest, and calmness. In fact, it is widely recognized that older adults who are engaged through strategies that evoke positive emotions tend to be more receptive to new experiences and challenges, which in turn can enhance their cognitive engagement, motivation, and overall well-being [30].

Therefore, this study examines how older adults respond to two different communication styles during an analogue game, focusing on both mood changes and game outcomes. Understanding how communication can facilitate positive affect and engagement offers valuable insight for designing interventions aimed at promoting successful learning and meaningful participation among older adults.

2. Materials and Methods

2.1. Type of Study

A non-randomised experimental study was conducted to compare two different communicative styles while using game-based learning approaches in older adults.

2.2. Sample Recruitment

A convenience sample of institutionalized older adults individuals was recruited from two nursing homes in the central region of Portugal. Participants were included if they: i) had preserved cognitive function, as assessed by the Mini-Mental State Examination, with cut-off scores adjusted for educational level (15 for illiterate participants, 22 for those with 1 - 11 years of schooling, and 27 for those with more than 11 years, according to [31]; ii) were able to perform basic upper limb movements, such as reaching and manipulating small objects; and iii) agreed to participate. Individuals were excluded if they had severe visual, auditory, or communication impairments.

Initially, 33 participants were selected (n = 20 from Institution 1 and n = 13 from Institution 2). However, three were later excluded (n = 2 and n = 1, respectively) due to unavailability during the study period. As a result, a total of 28 participants completed the study: 18 from Institution 1 and 10 from Institution 2. All participants were blinded to the communication style they would receive. At the end of the recruitment process, participants were randomly assigned, using closed envelopes, to one of two groups: Group 1, which received a humanized communication style (meaning centred) (n = 18), and Group 2, which received a straight communication style (message centred) (n = 10). Data collection took place between February and April 2024.

This study received ethical approval (reference CE//10/2024). Additionally, one health/social worker from each nursing home completed three hours of training on the game-based protocol and the communication styles to be implemented.

2.3. Game-Based Therapy Strategy

The intervention utilized Maestro (Agilidades, Inc.), a structured analogue serious game specifically developed to promote functional and cognitive stimulation in older adults. The game targets a range of therapeutic domains, including upper limb coordination, rhythmic and movement awareness, dual-task performance, laterality, symbolic pattern recognition, and narrative and auditory processing.

The game is composed of multiple interactive components (illustrated in **Figure 1**), each designed to elicit specific motor and cognitive responses:

Sequence Cards: These cards present progressively more difficult action sequences.

Categories include:

Simple sequences (2 - 3 elements without pauses);

Intermediate sequences (2 - 3 elements with embedded random pauses); and

Complex sequences (3 - 4 elements with random pauses);

which are intended to enhance planning, motor execution, and temporal processing.

Colored Discs:

Blue Discs (n = 8): Four feature physical challenge tasks on the reverse side (e.g., postural or movement-based), while the remaining four contribute to a cumulative scoring system.

Green Discs (n = 8): Follow the same structure as the blue discs, promoting bilateral coordination and task variation.

Pause Discs (n = 4): Introduce intentional breaks in activity, reinforcing response inhibition and attentional control.

Instructional Die: A custom 6-sided die guides activity flow, with four faces indicating which hand should be used to manipulate the blue and green balls during sequence execution. One face instructs the participant to repeat the previous action, and one prompts the use of a non-hand body part (e.g., elbow or foot), encouraging flexibility and creative motor planning.

Juggling Balls: Each participant is provided with one blue and one green soft ball, which serve as manipulatives for executing the action sequences dictated by the cards, dice, and facilitator instructions.

The structured use of these elements supports the integration of physical, cognitive, and sensory-motor training within a gamified therapeutic context, enhancing engagement and adaptability to older populations with varying functional levels.

Figure 1. From left to right, there are examples of a sequence card, a cumulative score disc, and one face of the dice; these are components from the board game Maestro (Agilidades, Inc.).

Among the mechanics that make up the game are dice rolling, speed matching, and set collection. Dice rolling introduces chance and uncertainty, as players roll the dice to determine actions based on the outcome. Speed matching is also a key element, requiring players to focus and react quickly as they compete to be the first to locate and collect different discs. Set collection is another mechanic, where players score points by gathering groups of items based on quantity or variety, influencing their decision-making throughout the game.

The game is played in pairs using a competitive strategy. Each player needs to be agile and collect as many discs as possible, as quickly as possible, in each game mode. To set up, a sequence of 10 cards is placed on the table, with sequences of

varying difficulty (as can be seen in **Figure 1**): easy (level 1), medium (level 2), and complex (level 3). A total of 20 discs are also placed on the table. Each player rolls the dice to receive instructions on how they should proceed in the current game mode. People should play for 20 minutes as part of the protocol. Players must perform the designated sequence, touching their ball to the corresponding disc until all available discs have been collected. The player who collects the most discs wins the round, earning 5 points for level 1, 10 points for level 2, and 15 points for level 3. The number of errors was recorded and accounted for. The facilitator should introduce the game using the communication style specified in the protocol (either humanistic or straight communication; see section "Communication Protocol"). The facilitator should also present the visual analogue scale once again and ask each player to indicate their level, recording the results.

2.4. Expert-Derived Communication Protocol for Structured Game Sessions

Two distinct communication styles were used in the intervention: one focused on a humanistic, meaning-centred approach, and the other employed a more straightforward, message-centred approach. The humanistic communication style is based on the description of the meaning-centred approach by Bland and DeRobertis [32] it emphasizes the unique qualities of optimal well-being and the use of creative potential for the benefit of others, as well as the relational conditions that foster these qualities as outcomes of healthy development. This perspective provides an alternative to mechanistic and reductionistic explanations of personality, which are often based on isolated, static elements of observable behaviour (e.g., quantifiable traits) or self-concept.

The straight communication style is based on message/meaning-centred communication approaches. A message-centred communication approach emphasizes the content and structure of messages, focusing on how information is crafted and delivered to achieve effective interaction. This approach considers the clarity, coherence, and organization of messages to ensure accurate understanding between communicators [33]. The following table shows the different criteria used in each of the communication approaches.

Considering the absence of established communication procedures specifically tailored to game-based interventions for older adults, we developed and implemented an original communication protocol. The protocol was grounded in the theoretical models previously described and was structured over five rounds (each lasting approximately 45 - 60 minutes), organized according to five core domains. Each round involved discussion and refinement of one domain, guided by a panel of three experts.

The five domains addressed were: i) non-verbal communication (e.g., posture, facial expressions); ii) verbal instructions; iii) reinforcement strategies (e.g., praise, rewards); iv) closure or session-ending interactions; and v) contextual framing (e.g., how the activity is introduced and situated).

The expert panel consisted of two professionals with a minimum of five years'

experience in geriatric care—one from the health sector and one from the social care domain—and a senior researcher in the field of dementia, with over ten years of research experience. Each domain was discussed in a dedicated round until full consensus was achieved among all three experts.

In cases where consensus was particularly challenging—for example, determining the appropriate level of detail to include in the contextual framing of the game—an external fourth reviewer, also a senior dementia researcher, was consulted to provide an independent assessment and help resolve disagreements. Table 1 provides an overview of the communication protocols and corresponding guidelines established for each domain.

To ensure fidelity in the implementation of the communication protocols, two technical staff members responsible for conducting the game sessions received structured training. This included two online sessions (each 2 hours) focused on the theoretical foundations and practical applications of both communication styles (humanist and direct). Following the training, each staff member participated in a pilot case study, during which they applied both protocols in a controlled setting.

An additional follow-up session was conducted to address any doubts or difficulties that arose during the pilot implementation. This allowed for clarification of procedures, reinforcement of protocol adherence, and refinement of techniques to ensure consistent delivery. Throughout the intervention phase, fidelity was further supported by using a standardised protocol manual and regular informal check-ins with the research team to monitor adherence and address any potential deviations.

Table 1. Guidelines for applying both communication styles.

Criteria	Humanist approach (meaning-centred)	Straight approach (message-centred)
Non-verbal (posture)	Monitor posture: Maintain a positive, happy facial expression; adopt a posture of readiness and empathy (through touch and proximity). Player posture: Instruct the player on the ideal posture for the game (perform some pre-activation exercises beforehand, guide the player to touch the different joints, and review the game cards).	Monitor posture: Maintain a neutral facial expression; use an action-oriented posture, directed toward the game. Player posture: Do not correct the player's initial posture. The player should sit as they choose; however, the monitor may assist the player in pushing the chair forward if they request it. Do not ask if the player needs help moving the chair forward.
Verbal instructions	Introduction: The supervisor explains the game's fundamental rules and the benefits: "Are you prepared for a period of training and learning?"; "This activity can be beneficial for…"; "But for it to bring benefits, I need a lot of your help and collaboration"; "Can I count on you?"; "If you have any suggestions to introduce into the activity, I am available to listen to you"; "I will start by explaining/reminding all the rules and the format of the activity"; "I repeat as many times as necessary" Initial verbal instructions: "Let's start? Let's do it!"	Introduction: "The supervisor explains the fundamental rules of the game; however, the benefits are not explained: "I'm going to explain how the activity is performed…" Initial verbal instructions: "Let's start!"

Continued

Rewards/ reinforcing	During the game: - If unsuccessful: "Failing makes us human"; "Let's keep working until we feel capable of taking on all of the activity's challenges"; "Tomorrow we keep trying!" - If successful: "Very well done! Congratulations! I think we will progress in the game, quickly moving to the next level"; "Keep up this performance, and we will see great results for your physical and mental health!" - If hesitant: "The secret to being healthier is to try, without fear of making mistakes. If you need, I can repeat all the rules and game formats"; "Don't be afraid to ask and don't hesitate to try"; "I can help with whatever you feel is necessary"	During the game: - If unsuccessful: "This play wasn't done right, let's think of the next" - If successful: "Very well, let's keep going" - If hesitant: "We have to play faster, let's get on with it"
Ending	"That was an amazing session! Your effort and dedication during this session were an example for everyone!"; "Shall we continue working (tomorrow, or another day)?"; "I would love to hear your thoughts about this experience, tell me what you think"	"That's it, you can go"
Context	Fill the environment with details that make it welcoming: a quiet, tidy space, with a clean worktable, calm instrumental music.	When the player gets to the workspace, the game should already be organized and ready on the worktable

2.5. Assessment Instruments

Sociodemographic characteristics: It was implemented a structured questionnaire, based on the following domains: i) gender (female, male); ii) age (in years); iii) formal education (unable to read/write [code 0]; able to read or write, but without formal schooling [code 1]; basic school education [code 2]; secondary school education [code 3]; other [code 4]).

Visual analogue mood scale (VAMS): This scale was implemented to assess the impact that each communication style had. This emotional evaluation tool consists of three dimensions: arousal, joy, and calmness (**Figure 2**). The first two align with the axes of the circumplex model, while the third dimension, anxiety-calmness, is an additional feature [34]. The patient marks on the line the point that they feel represents their perception of their current state (0-tiredness-10-arousal, 0-sadness-10-joy, and 0-anxiety-10-calmness). The VAMS score is determined by measuring in millimetres from the left-hand end of the line to the point that the patient marks. Ratings before exposure to game-based intervention (Before game) were compared with ratings after exposure (After game). The visual representation of VAMS is shown in **Figure 2**. The VAMS method has undergone extensive psychometric evaluation [35]. This approach, along with similar paper-and-pencil tests, has a long-standing tradition in psychometric applications. For a categorical analysis of VAS scores, it was considered low values if between [1 - 4]; moderate values if between [4 - 7]; high values between [7 - 10].

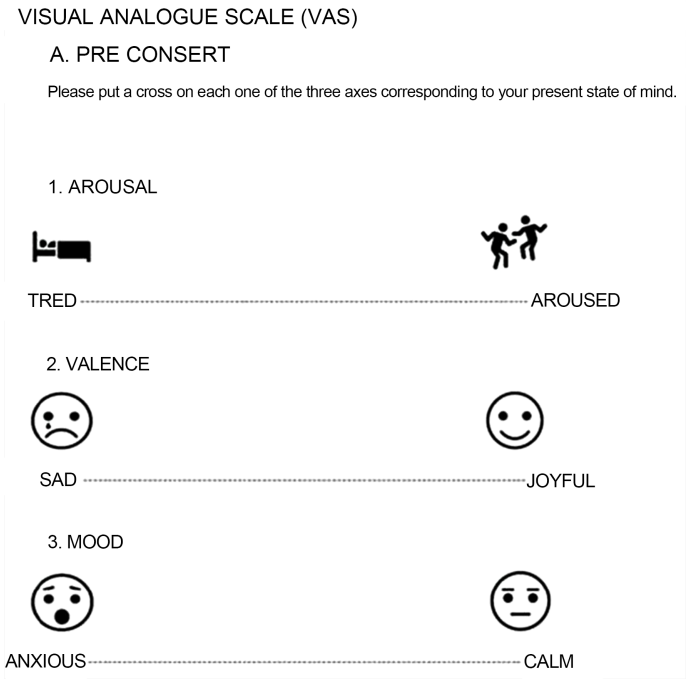

Figure 2. Visual representation of VAMS (adapted from [35]).

Game outcomes: To assess the effectiveness of the communication protocol on players' performance, game outcomes were measured based on task completion success. Success rates were calculated as the percentage of correctly completed tasks relative to the total number presented [36]. These outcomes provided a quantifiable indicator of skill acquisition and task comprehension under different communication conditions. Data collection was conducted in real time by trained observers, who recorded the number of successful attempts for each participant.

2.6. Statistical Analysis

To describe and analyze the sample characteristics, absolute values (and percentages) were used, except for age, where mean and standard deviation were reported. Group comparisons were conducted for age, gender, and formal education distribution using the Mann-Whitney test for age and the Chi-Square test for gender and formal education.

The Visual Mood Analogue Scale (VMAS) scores for each group (Group 1—humanized communication approach (G1); Group 2—direct/straight communication approach (G2)) were described using absolute values and descriptive statistics (mean and standard deviation). A non-parametric Wilcoxon test (repeated measures) was conducted to compare the changes in VMAS score differences (post- vs. pre-game-based protocol) within each group.

To compare the game success percentages between groups, the Mann-Whitney test was implemented. An outlier, Participant 5, was removed from the analysis.

The Spearman test was used to calculate the correlation between the percentage

of game success and VMAS scores at T0, T1, as well as the changes between T1 and T0. Correlation coefficients with magnitudes between 0.5 and 0.7 indicate a moderate correlation between the variables, while coefficients between 0.3 and 0.5 suggest a low correlation.

The statistical analysis was conducted using Statistical Package for the Social Sciences (SPSS), version 21.0. A *p*-value of less than 0.05 was considered statistically significant for all tests performed.

3. Results

3.1. Sample Characteristics

Twenty-eight older adults participated in this study, eighteen received humanised communication approach (Group 1) and ten received straight communication approach (Group 2). There were non-significant statistical differences between groups in gender (33.3% vs 40.0% male), age (78.17 vs 78.30 yrs old) or formal education levels (can not read/write: 5.6% vs 10.0%; basic education: 94.4% vs 90.0%) (Table 2).

Table 2. Sample general characteristics, including the distribution in gender (male, female), age and formal education.

	Group 1 N = 18	Group 2 N = 10	*p*-value
Gender			
Male	6 (33.3%)	4 (40.0%)	0.24
Female	12 (66.7%)	6 (60%)	
Age (years)	78.17 ± 9.06	78.30 ± 6.25	0.83
Formal education[(a)]			
Code 0	1 (5.6%)	1 (10.0%)	
Code 1	--	--	0.24
Code 2	17 (94.4%)	9 (90.0%)	
Code 3	--	--	
Code 4	--	--	

[(a)]Codes for formal education: 0—can not read/write; 1—non formal education, can read/write; 2—basic education; 3—secondary education; 4—other.

3.2. Visual Mood Analogue Scale (VMAS) Analysis

In Group 1 (Table 3), which received humanised communication approach, arousal, valence, and mood states generally increased when compared to the moment before and after the implementation of Maestro, assuming different categories on VMAS scoring for valence (5.44-moderate vs 7.22-high) and for mood (6.5-moderate vs 7.72-high). Changes in VMAS scores were statistically significant only for valence (1.78; $p = 0.016^*$) and mood (1.22; $p = 0.020^*$) states. Arousal didn't change significantly, remaining in moderate VMAS values after the game (5.33 vs 5.89).

Table 3. Score of visual mood analogue scale (VMAS) in Group 1 (humanised communication style) during the implementation of the Maestro Game.

	Before game			After game			Changes[after-before]		
	Arousal[(b)]	Valence[(c)]	Mood[(d)]	Arousal[(b)]	Valence[(c)]	Mood[(d)]	Arousal[(b)]	Valence[(c)]	Mood[(d)]
P1	5.00	9.00	8.00	9.00	4.00	8.00	4.00	−5.00	0.00
P2	6.00	6.00	8.00	6.00	6.00	8.00	0.00	0.00	0.00
P3	4.00	3.00	5.00	7.00	7.00	6.00	3.00	4.00	1.00
P4	5.00	6.00	1.00	5.00	8.00	5.00	0.00	2.00	4.00
P5	4.00	6.00	4.00	4.00	6.00	4.00	0.00	0.00	0.00
P6	3.00	4.00	8.00	5.00	6.00	10.00	2.00	2.00	2.00
P7	5.00	8.00	7.00	5.00	10.00	10.00	0.00	2.00	3.00
P8	7.00	4.00	6.00	7.00	7.00	6.00	0.00	3.00	0.00
P9	4.00	5.00	5.00	4.00	5.00	4.00	0.00	0.00	−1.00
P10	3.00	7.00	7.00	2.00	7.00	7.00	−1.00	0.00	0.00
P11	5.00	7.00	8.00	5.00	9.00	8.00	0.00	2.00	0.00
P12	4.00	6.00	10.00	5.00	7.00	10.00	1.00	1.00	0.00
P13	6.00	1.00	10.00	5.00	6.00	10.00	−1.00	5.00	0.00
P14	10.00	10.00	10.00	10.00	10.00	10.00	0.00	0.00	0.00
P15	7.00	5.00	1.00	8.00	8.00	8.00	1.00	3.00	7.00
P16	5.00	5.00	7.00	3.00	6.00	7.00	−2.00	1.00	0.00
P17	6.00	1.00	8.00	9.00	10.00	10.00	3.00	9.00	2.00
P18	7.00	5.00	4.00	7.00	8.00	8.00	0.00	3.00	4.00
Mean	5.33	5.44	6.5	5.89	7.22	7.72	0.56	1.78	1.22
SD	1.72	2.38	2.73	2.17	1.73	2.08	1.54	2.82	2.07
p-value	–	–	–	–	–	–	0.151	0.016*	0.020*

[(b)]Arousal: 0-tiredness-10-arousal; [(c)]Valence: 0-sadness-10-joy; [(d)]Mood: 0-anxiety-10-calmness. *Statistically significant at $p < 0.05$.

In Group 2 (Table 4), which received a straight communication approach, arousal, valence, and mood states generally increased when compared to the moment before and after the implementation of Maestro. Valence and mood VMAS scoring have started the study in the higher category (7.50 vs 7.20). Changes in VMAS scores were statistically significant only for arousal (0.40; $p = 0.034$*) and valence (0.20; $p = 0.046$*) modes. Notably the arousal changed from the VMAS category during the procedure (6.90-moderate; 7.70-high).

Table 4. Score of visual mood analogue scale (VMAS) in Group 2 (straight communication style) during the implementation of Maestro Game.

	Before game			**After game**			**Changes after-before**		
	Arousal[(e)]	Valence[(f)]	Mood[(g)]	Arousal[(e)]	Valence[(f)]	Mood[(g)]	Arousal[(e)]	Valence[(f)]	Mood[(g)]
P19	7.00	6.00	7.00	7.00	7.00	5.00	0	1	−2
P20	6.00	8.00	7.00	6.00	8.00	6.00	0	0	−1
P21	7.00	8.00	7.00	8.00	8.00	8.00	1	0	1

Continued

P22	7.00	6.00	7.00	7.00	7.00	7.00	0	1	0
P23	7.00	7.00	8.00	8.00	8.00	8.00	1	1	0
P24	7.00	8.00	8.00	7.00	8.00	7.00	0	0	−1
P25	6.00	6.00	6.00	6.00	6.00	6.00	0	0	0
P26	7.00	10.00	7.00	10.00	10.00	10.00	3	0	3
P27	8.00	8.00	8.00	9.00	9.00	9.00	1	1	1
P28	7.00	8.00	7.00	8.00	8.00	8.00	1	0	1
Mean	6.90	7.50	7.20	7.60	7.90	7.40	0.70	0.40	0.20
SD	0.57	1.27	0.63	1.26	1.10	1.51	0.95	0.52	1.40
***p*-value**	–	–	–	–	–	–	0.034*	0.046*	0.726

[e]Arousal: 0-tiredness-10-arousal; [f]Valence: 0-sadness-10-joy; [g]Mood: 0-anxiety-10-calmness. *Statistically significant at $p < 0.05$.

Changes in VMAS scores after and before the game implementation were statistically different between Group 1 and Group 2 only for valence mode quotation (1.78 vs 0.40; $p = 0.041$*). For arousal ($p = 0.42$) and mood ($p = 0.20$) changes, there were no statistical differences between groups.

3.3. Communication Model and Game Outcomes—Exploring Correlations

In group 1, mean values for % of success on the game were 0.84 ± 0.09 (0.86; IQR 0.14). In group 2, mean values were 0.93 ± 0.07 (0.93; IQR 0.12). Group 2 presented a statistically significantly higher percentage of game success ($p = 0.013$*) (Figure 3).

In G1 the percentage of success is only moderately correlated with mood scoring at T1 (s = 0.54; $p = 0.02$). In G2, four different significant and positive correlations were found: high correlation between % success and: arousal at T0 (s = 0.76; $p = 0.01$); arousal at T1 (s = 0.66; $p = 0.04$); mood at T1 (s = 0.77; $p = 0.01$); arousal T1-T0 (s = 0.74; $p = 0.015$) (Table 5).

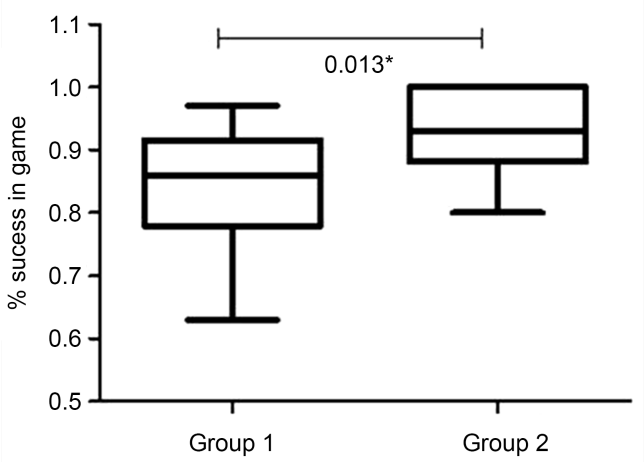

Figure 3. Comparison of game success percentage between Group 1 and Group 2. *Statistically significant at $p < 0.05$.

Table 5. Correlations between percentage of game success and VMAS scores before and after the game protocol, as well as the differences (After vs. Before).

% GAME SUCCESS		
	Group 1 Humanistic approach	Group 2 Straight approach
Arousal T0		
test	0.45	0.76
p-value	0.06	0.01*
Arousal T1		
test	0.25	0.66
p-value	0.32	0.04*
Valence T0		
test	0.15	0.33
p-value	0.55	0.36
Valence T1		
test	0.32	0.55
p-value	0.20	0.09
Mood T0		
test	0.38	0.57
p-value	0.12	0.09
Mood T1		
test	0.54	0.77
p-value	0.02*	0.01*
Arousal diff		
test	−0.21	0.74
p-value	0.41	0.015*
Valence diff		
test	−0.20	0.325
p-value	0.94	0.360
Mood diff		
test	0.03	0.608
p-value	0.91	0.062

*Statistically significant at $p < 0.05$.

4. Discussion

The present study provided an important and innovative outcome on communicative style in a context where games and serious games can offer significant cognitive and physical benefits, particularly in geriatric care.

Participants in both groups reported feeling more joyful after the game-based intervention; however, this increase was more pronounced in the group that received humanized communication (1.78; $p = 0.016$* vs 0.40; $p = 0.046$*). Addi-

tionally, participants reported feeling calmer after the intervention only in Group 1 (1.22; $p = 0.020$*). These findings align with a previous study by Sundling *et al*. [37] on communication methods in-home care for older adults. That study highlights the effectiveness of patient-centred, humanistic communication, particularly when older adults express emotional or social care needs. Moreover, the same study supports one of the key principles of the communication protocol proposed in the present research, emphasizing that the structured context in which older adults care is provided should be seamlessly integrated into the chosen communication approach (e.g., a quiet, tidy space, with a clean working table, calm instrumental music).

Despite the potential benefits of a humanistic communication style—such as promoting calmness and joy—when implementing game-based interventions with older adults individuals, some literature highlights the need to avoid potential drawbacks. One concern is that this approach may unintentionally foster a more paternalistic dynamic, as it often involves avoiding direct acknowledgement of errors or discussions about difficulties and limitations in performing tasks. According to Lazcano-Ponce *et al*. [38], such paternalism may be linked to reduced autonomy for those receiving health or social care.

A significant increase in arousal mood was observed only in Group 2, which received a straight communication approach. This indicates that participants in this group felt more excited after the game-based protocol (0.70; $p = 0.034$). This could provide valuable insight into which types of mental disorders are best suited to different communication styles. If a straight communication approach increases feelings of excitement—and, as suggested by the systematic review from Lau *et al*. [39], may be less appropriate for impulse-related disorders—it could instead prove more effective for conditions characterized by apathy or depression. Given the potential benefits of tailoring communication styles to behavioural symptoms in mental health disorders, it would be worthwhile to investigate further both approaches in specific populations with varying mental health conditions.

The percentage of success in game was statistically higher for the group that receives the straight communication approach ($p = 0.013$). Only for this group there is a strong correlation between the change in arousal mood (before vs after game) and the success in game (s = 0.74; $p = 0.015$). In the model proposed by Kiili [40], it was concluded that a clear understanding of a game's goals and mechanics is essential for fostering a positive flow experience and enhancing the player's overall journey. Additionally, Chen [41] suggests that this clarity supports a sense of autonomy and promotes free choice, empowering players to take risks and increasing their sense of accomplishment—ultimately leading to greater excitement, enjoyment, and playfulness, which may contribute to overall gaming success.

Calmness at the end of the game appears to be associated with higher game success in the group that received the straightforward communication approach.

Contrary to these findings, a previous study by Wibe [42] found that a stressed mood was more closely linked to game performance when time-related variables were controlled. However, in the present study, performance was measured based on errors rather than reaction time. Therefore, maintaining a state of calm after the game may reflect stronger self-regulation skills, which could support better error detection and prevention during gameplay. Moreover, the systematic review by Mitsea *et al.* [43] emphasizes that cognition, motivation, and emotional intelligence work together as a foundation for developing meta-skills. Enhancing calmness can be seen as a sign of emotional intelligence, which may, in turn, activate cognitive processes—ultimately contributing to better player performance. Notably, mood changes—specifically shifts from anxiety to calmness—were observed only in the group that experienced the straightforward communication approach. This is particularly interesting, as it suggests that this communication style may promote self-regulation in older adults participants.

Apart from this study, we are unaware of other established protocols specifically designed for communicating games to older adults individuals. A noteworthy review by Sharkiya [44] outlines key guidelines for ensuring effective communication in healthcare settings. While the studies included in the review show some variation in communication strategies, several valuable insights could enhance a game communication protocol:

i) Non-verbal communication—incorporating elements like touch (e.g., skin-to-skin contact, a gentle pat on the shoulder), smiling, moments of silence, and active listening. Defining appropriate moments to apply these strategies during gameplay could enhance engagement and emotional comfort.

ii) Verbal communication—the review also highlights conflict resolution techniques as a particularly relevant component that could be beneficial when adapted to game-based communication, helping to manage frustration or misunderstandings that may arise during the activity.

By reflecting on the study's methodological design, we recognize that the sample size was small in both groups, with Group 1 consisting of 18 participants and Group 2 including only 10 participants. Additionally, Group 2 started the study with higher VMAS scores. Despite these differences, no significant variations were found between the groups in terms of gender, age, or formal education ($p > 0.05$). To minimize potential bias in future research, it would be valuable to normalize VMAS scores at baseline, ensuring that any changes observed throughout the game-based intervention can be more reliably attributed to the intervention itself.

Given the novelty and importance of this topic, future research should focus on developing appropriate guidelines for communicating games to older adults individuals, strengthening their potential as a therapeutic strategy.

Specifically, further studies could investigate how older adults individuals with lower cognitive profiles respond to different communication styles during game-based interventions. This population may be less aware of the game's therapeutic purpose, instead focusing more on the emotional and social context—including

how communication is delivered. Understanding these responses could provide valuable insights into refining communication strategies to enhance engagement, emotional well-being, and overall therapeutic outcomes for this vulnerable group.

This study employed a non-randomized design due to logistical and ethical constraints associated with the setting and the characteristics of the target population. Specifically, participants were recruited from two distinct yet comparable community centers, each of which implemented a different communication approach (humanized vs. straight). This strategy was selected to minimize contamination between conditions and to ensure consistency in communication style across participants within each group. However, the absence of random allocation introduces the possibility of selection bias and confounding factors that may affect group comparability. Although baseline characteristics (age, gender, and education) did not significantly differ between groups, unmeasured variables—such as participants' baseline cognitive status, social engagement levels, or prior exposure to similar activities—may have influenced both their emotional responses and performance outcomes. We acknowledge that these potential confounders could impact the internal validity of our findings.

5. Conclusion

Participants in both groups reported increased feelings of joy following the game-based intervention however, this effect was more pronounced in the group that experienced humanized communication. While this approach may foster positive emotional outcomes, it should be accompanied by carefully designed guidelines to prevent unintentionally fostering a paternalistic dynamic. The straightforward communication approach, on the other hand, appeared to stimulate excitement after the intervention. This response may be less suitable for individuals with impulse-related disorders but potentially more effective for those experiencing apathy or depression, where increased arousal could encourage engagement. When focusing on game outcomes (% success), the straightforward communication style may offer an advantage—likely due to its clarity in conveying the game's goals and mechanics, which can enhance the player's understanding and overall experience. Although this study involved a small and asymmetrical sample, it provides valuable, innovative insights into the importance of tailoring communication styles when implementing game-based interventions for older adults. Future research should explore a more comprehensive framework of communication strategies and examine their effects in specific older adults populations, such as those with cognitive decline.

Declarations

The study was approved by the Ethics Committee of the Polytechnic University of Leiria (Reference: CE/IPLEIRIA/10/2024). All participants were informed about the study procedures and objectives, and each provided written informed consent prior to participation, following the Declaration of Helsinki. The authors would

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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