THE IMPACTS OF UTILIZING PSYCHOTHERAPY GAMES ON ELDERLY DURING COVID-19 PANDEMIC

Noraziah ChePa
Human Centred Computing Research Lab, School of Computing,
Universiti Utara Malaysia, Kedah
Email: aziah@uum.edu.my

Laura Lim Sie-Yi
Human Centred Computing Research Lab, School of Computing,
Universiti Utara Malaysia, Kedah
Email: lauralim041@gmail.com

Rusdi Ishak
Pejabat Kebajikan Masyarakat Daerah Kubang Pasu, Jitra, Kedah
Email: rusdi@jkm.gov.my

Nooraini Yusoff
Faculty of Bioengineering and Technology
Universiti Malaysia Kelantan (Jeli Campus), 17600 Jeli, Kelantan
Email: nooraini.y@umk.edu.my

Wan Ahmad Jaafar Wan Yahaya
Centre for Instructional Technology and Multimedia, Universiti Sains Malaysia
Email: wajwy@usm.my

ABSTRACT

The Movement Control Order (MCO) that has been declared by Malaysian government due to COVID-19 pandemic with the intention to avoid the spreading of new infections has restricted many normal activities of people including activities of elderly residing at elderly care centres. Since elderly is susceptible to the virus, tighter restrictions are imposed at the elderly care centres to mitigate the risks. However, this has isolated the elderly from outside world and affected them emotionally (feelings of helplessness, boredom, loneliness, stress, and and depression). To solve this, caretakers at the elderly care centres have opted for alternative activities that can be conducted within the care centres. Subsequently, with a believe that digital game interventions are effective at improving cognition among elderly, a psychotherapy game namely [Neuro]-therapy has been introduced to a group of elderly at Rumah Seri Kenangan Bedong, one of the elderly care centres administered by Department of Social Welfare (JKM). The utilization of the game has become one of the alternatives to elderly in combatting their emotional effects due to the MCO. [Neuro]-therapy game has been utilized for three months during the MCO with combination of self-learning and minimal supervision by the caretakers. Some interesting findings have been discovered and analyzed which indicate the impacts of [Neuro]-therapy game on elderly; task solving skills, IT-literacy, knowledge, tactical skills, and positive attitude as well as bridging digital divide. The interesting and positive findings can be attributed to the integration of digital game and psychotherapy for elderly, particularly those with memory disorder symptoms.

Key words: COVID-19, elderly, elderly care centre, memory disorder, Psychotherapy games

INTRODUCTION

The elderly Care Centre is recognized as among the facilities of long-term care which offer permanent living room and support for the elderly, with everyday living activities that provide greater standards of personal care and support for the needs of the elderly (Ministry of Health and Long-Term Care's Emergency Response Plan, 2013). Long-term care services also include nursing homes, clinics, hospices and care homes (Hasbollah et al., 2018). In Malaysia, Elderly Care Centre are known as Rumah Seri Kenangan (RSK) are administered and managed by the Department of Social Welfare, Ministry of Women, Family and Community Development (Jabatan Kebajikan Masyarakat, 2020).

RSK is established to provide care and protection to the poor elderly in order to ensure their well-being and quality of life. Services provided at RSK include care and protection, guidance and counseling, recreational activities, medical treatment, work-based therapy and physiotherapy. RSK has always been concerned about the welfare of underprivileged elderly by providing financial assistance to those living alone or with their families. Care at the Welfare Institution is also provided for those in need so that they can enjoy a better and more fulfilling life. There are ten RSK located in most of the states in Malaysia; RSK Bedong, Kedah; RSK Taiping, Perak; RSK Kinta, Perak; RSK Seri Iskandar, Perak; RSK Kangar, Perlis; RSK Cheng, Melaka; RSK Seremban, Negeri Sembilan; RSK Johor Bahru, Johor; RSK Cheras, Selangor; and RSK Kemumin, Kelantan. (Jabatan Kebajikan Masyarakat, 2020).

In Kedah, personal communication with administration staff stated that there are 243 elderly registered at RSK Bedong, Kedah and they stay in fully facilitated hostel. There are male hostels and female hostels in RSK Bedong. Six scheduled meals per day are provided to the elderly and male elderly will have their meals in dining hall while female elderly will have their meals in their dorms. RSK Bedong owns a clinic with one Medical Assistance and two nurses. The elderly will be checked dorm to dorm by the nurses every morning to make sure they are in good condition. Medicine is prescribed by Medical Assistance for the elderly in need. There are also physiotherapy facilities available in RSK Bedong with one Psychiatrist from Ministry of Health (MOH) who came once in three months for diagnosis (Hasmida, 2020).

Art therapy is the most preferred activity by the elderly in RSK Bedong. Elderly is allowed to watch television during their free time in the tv room. RSK Bedong provides religion class (Muslim, Kristian, Hindu buddha) once a week, the teachers are invited to RSK Bedong to give lectures and conduct activities once a week. Study tours are also being organized for the elders to visit other places. However, elderly need more time to rest, thus not much activities can be scheduled in one day. Nonetheless, visitation from other organization in RSK always schedule ahead and it usually occupied fully (Hasmida, personal communication, 22 April, 2020).

COVID-19 AND ITS IMPACT ON ELDERLY

The world is experiencing a viral onslaught of herculean proportion in the form of COVID-19 (Coronavirus disease 2019) caused by SARS-CoV-2 (severe acute 69 respiratory syndrome coronavirus 2) (Chen & Li, 2020). Both infection rate as well as death from COVID-19 have exhibited an exponential growth (Koczkodaj et al., 2020). The whole attention now is on prevention and management strategies related to it. As the disease evolved, we learned that not all patient population are at equal risk of morbidity and mortality. The elderly and those with additional co-morbidities in the form of diabetes, hypertension and background cardiovascular compromise are at higher risk than those without these co-morbid diseases (Jordan et al., 2020).

Malaysia is currently under Movement Control Order (MCO) starting March 18 2020 due to COVID-19 pandemic as the government's priority now is to avoid the spreading of new infections, which will affect more people (Bunyan, 2020). All government and private premises are forced to close during MCO. One of the measures to reduce the impact of this pandemic is to practice social distancing. The guideline provided by MOH in Social Distancing for Assisted or Senior Living Facilities including reduce large gatherings (e.g., group social events). Reduce large gatherings (e.g., group social events), alter schedules to reduce mixing (e.g., stagger meal, activity, arrival/ departure times). Limit programs with external staff, and consider having residents stay in facility and limit exposure to the general community. Limit visitors and screen them before allowing entry (COVID-19: Social Distancing Guidelines for Workplace, Homes and Individuals, 2020).

Since elderly is susceptible to the virus, tighter restrictions are imposed at the elderly care centres to mitigate the risks. However, this has isolated the elderly from outside world and affected them emotionally (feelings of helplessness, boredom, loneliness, stress, and and depression). During crisis / disasters / pandemics, any individual might be affected emotionally as this is happening during the COVID-19 crisis. Feelings of helplessness, boredom, loneliness and depression due to being isolated. Increased stress due to not being able to perform outdoor routines and activities, not being able to see friends. Helplessness, boredom, loneliness, and depression can also set in (Mental Health and Psychosocial Support in COVID-19, 2020).

The activity engagement hypothesis posits that the involvement of physical, social, and intellectual activities in older adulthood prevents the decline of the cognitive abilities, indicating that engaging in activities affects later cognitive performance (Lee et al., 2018). Systematic review revealed evidence suggests that cognitive training leads to observable improvements in the global cognitive status of individuals with Alzheimer's Diseases (AD), as well as enhanced performance in tasks similar to the trained exercises. These effects seem to result from longer and more intensive training programs. It also seems that shorter interventions focusing on a specific aspect of cognitive functions may lead to specifically targeted effects. The generalization of the treatment effects beyond the trained cognitive tasks remains to be demonstrated (Kallio et al., 2017).

Unstructured training is often referred to as "unspecific brain jogging." In this type of training program, cognitive tasks are randomly combined, without special focus on a specific cognitive domain or target group (Simons et al, 2016). Brain jogging is thus mainly directed at practicing core cognitive abilities, and its goal is to improve performance on more than the usually trained key cognitive tasks (ie, memory, attention, executive functions), including performance of everyday activities (Simons et al, 2016). The main finding of this study is that healthy older adults who participated in a structured cognitive training program showed a statistically significant improvement in the domain of verbal short-term memory compared with older adults who received no cognitive training (Roheger et al., 2019).

COVID-19 AND ITS IMPACT ON ELDERLY

One of the contributing factors to the development of dementia is normal aging, which is considered as syndrome where the elderly shows symptoms and sign of memory disorder causes by interacting aetiologies that affect brain progressively (Kenigsberg et al., 2016). Patients will face difficulties in their daily life and routine for instant having problem to tell what is in their mind, hard to solve a simple problem and lost temper easily. The most common sign that can be seen in a patient with dementia or Alzheimer's Diseases (AD) is loss of memory other than changes in behaviour and personalities (Sie-yi & Chepa, 2020). Different types of treatments are available such as drugs or psychotherapy intervention which is more preferable due to the factors of costing and free from side effects.

Systematic review shows evidences suggesting that psychotherapy involving cognitive training led to observable improvements in the global cognitive status of individuals with AD, as well as enhanced performance in tasks similar to the trained exercises. These effects seem to result from longer and more intensive training programs. It also seems that shorter interventions focusing on a specific aspect of cognitive functions may lead to specifically targeted effects (Kallio et al., 2017). Meanwhile, unstructured training is another option in psychotherapy which often referred to as "unspecific brain jogging." In this type of training program, cognitive tasks are randomly combined, without special focus on a specific cognitive domain or target group (Simons et al., 2016). Brain jogging is thus mainly directed at practicing core cognitive abilities, and its goal is to improve performance on more than the usually trained key cognitive tasks (ie, memory, attention, executive functions), including performance of everyday activities (Roheger et al., 2019).

Game interventions were found to possess sensible benefits in boosting the treatment adherence and accessibility within health fields (Li, 2014). Psychotherapy through games require mental concentration, memory, and quick motor reaction in simulating brain to work and gain memory back (ChePa et al., 2020). The flexibleness of personal deployment, the wider range of benefits, and the value of relief suggest that game-based intervention is among the most effective decision for delivering non-pharmacological treatment to individual with memory disorder related diseases (Sie-yi & Chepa, 2020). The purpose of including game in rehabilitation and intervention is to boost the motivation of the patients to continuously undergo the process while the brain will keep working on all function along with the memory (Michael, 2005). It is assumed that by using active simulation and engaging part of the brain are pertaining to cognitive functions can lead to recovery of its functions which is believed to effect positively on other cognitive areas of a patient (Laskowska et al., 2013; Sie-yi & Chepa, 2020).

Older adult who believes strongly that digital game interventions are effective at improving cognition is predicted to be more likely to adopt this technology. Perception of effort required to learn and use a new technology also plays an important role. In this case, effort expectancy may be partly shaped by previous experience with technology platforms on which these interventions are typically delivered (personal computer, tablet, smartphone) (Boot et al., 2016). This perception is supported by the evidence in the research conducted by ChePa et al. (2020) with a mobile psychotherapy game designed and developed in Android environment namely *[Neuro]-therapy* game (ChePa et al., 2020). *[Neuro]-therapy* game is successfully developed and evaluated according to the design customized specifically for elderly in terms of game flow and flexibility of the psychotherapy game. The result shows that *[Neuro]-therapy* game is perfectly functioning to be implemented in psychotherapy for elderly.

METHODOLOGY

Game-based psychoterapy experiments have been conducted at Rumah Seri Kenangan (RSK) Bedong, Kedah involving several subjects among elderly who are showing the systems of memory disorder. Names of the subject were initially suggested by the administrator of RSK, however their partipication in the experiments was on voluntary basis. Figure 1 shows phases involved in game-based psychotherapy sessions followed by its decsriptions.

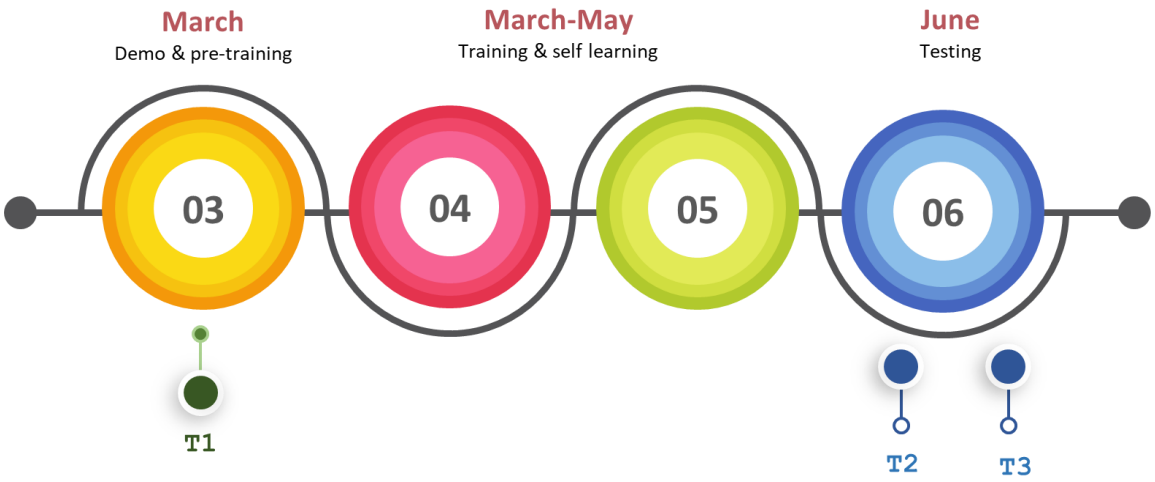

Figure 1. Phases of game-based psychotherapy sessions

Game demonstration and pre-training

The first session (T1) started in the first week of March, 2020. The session started with an introduction and demonstration of *[Neuro]-therapy* game to the subjects involved. *[Neuro]-therapy* is a puzzle game which is designed and developed specifically for elderly to exercise memory therapy (ChePa et al., 2020). The aim of playing the game is to train memory and recall improvement by assembling the jigsaw puzzle with less required time. As a beginning, the puzzles included are in three main categories which are familiar to elderly; face, fruits, and vehicles. To get a complete image, users are required to assemble the puzzles of a particular image. With a variety of difficulty levels, the puzzles are prepared to demonstrate the capability of memory recall. Figure 2 shows selected interfaces of *[Neuro]-therapy* game.

Figure 1. Selected interfaces of *[Neuro]-therapy* game

For pre-training purposes, all subjects are given opportunity to play the game with close supervision by the researchers and caretakers of RSK. Although the beginning of session was tough, regular memory training and the exercises incorporated in the game are extremely useful. The game is not limited to only enhancing memory recall, but they also enhance problem solving and critical thinking skills and improve focus. For instance, for each puzzle to be solved, the game gives a time period, hence time to perform mental computation is reasonably fast.

Training and self-learning

The initial plan was to have the game-based psychotherapy sessions for three sessions in six months (two months interval). However, due to MCO that has been declared starting 18 March 2020, the initial plan had to be adjusted since elderly is susceptible to the COVID-19 virus, tighter restrictions are imposed at the elderly care centres to mitigate the risks. No close activities or close contact with outsiders are allowed with the elderly at RSK. Hence, a longer training session has been conducted for three months with self-learning and minimal supervision by the caretakers at RSK. For this purpose, tablets with pre-installed *[Neuro]-therapy* game are provided for them to explore, play, and utilize it for memory training. Longer training sessions due to MCO create favourable cicumstances for elderly to utilize the *[Neuro]-therapy* game.

Testing

This phase is meant to test elderlys' response to game-based psychotherapy sessions. Tests can only be conducted in Phase 7 of MCO, which is Recovery Movement Control Order (RMCO) that has been declared between 10th June till 31th August 2020. Two tests have been conducted; T2 and T3 with one week interval time. Adjustment has to be made to the initial plan considering enough training are given to the elderly for three months during six phases of MCO. Elderlys' responses are measured through their brain's state and activities. To achieve this, electroencephalography (EEG) reader is used to record elderly's brain activities while playing *[Neuro]-therapy* game. The setting up of this activity are shown in Figure 3.

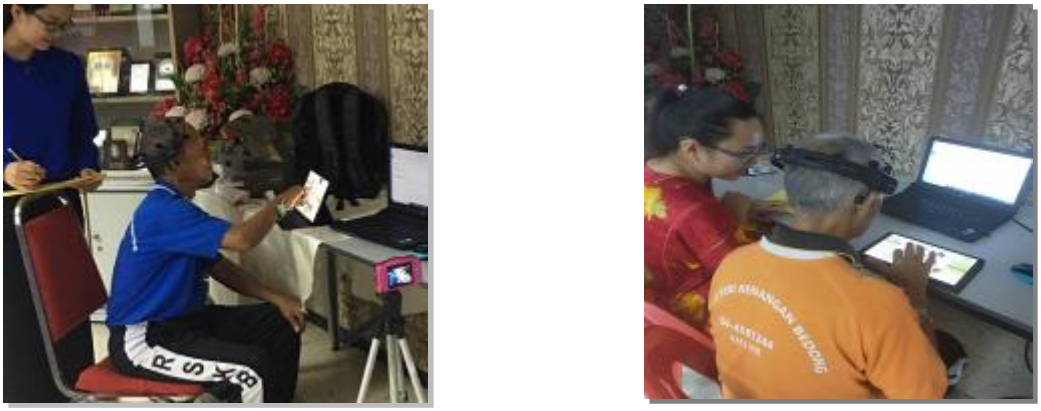

Figure 2. The utililization of *[Neuro]-therapy* in game-based psychotherapy sessions

During testing, EEG reader is placed on their head connecting to the most sensitive area of the head through 14 channels. The reader will read, capture, and record their brain activities while playing *[Neuro]-therapy* on their focus, interests, engagement, and other interesting brain activities. Data for T2 and T3 are recorded in this phase which indicate the changes to their brain activities compared to its initial state (T1).

FINDINGS AND DISCUSSION

Although the utilization of *[Neuro]-therapy* game is a part of the requirements in game-based psychotherapy sessions, MCO has created favourable cicumstances for elderly to utilize the game for longer duration as a part of their daily activities and memory recall interventions. Some interesting findings have been discovered and analyzed which indicate the impacts of *[Neuro]-therapy* game on elderly; task solving skills, IT-literacy, knowledge, tactical skills, and positive attitude as well as bridging digital divide.

The improved skills and literacy that have been onserved are categorized into five aspects; task solving skills, IT-literacy, knowledge, tactical skills, and positive attitude as illustrated in Figure 4.

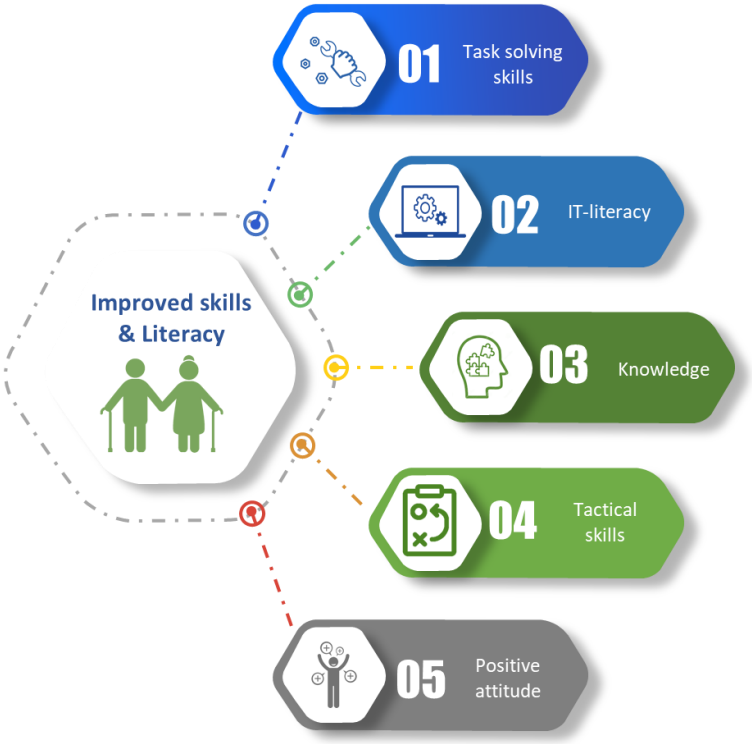

Figure 3. The improved skills and literacy from game-based psychotherapy

Task solving skills

The main task to be solved in *[Neuro]-therapy* game is to assemble puzzle pieces into a complete image with different level of difficulties based on the number of puzzles. The easiest level contains four pieces of puzzles (2x2 size) and the toughest level consist of 25 puzzle pieces (5x5 size). The task is to assemble puzzle pieces into a complete image starting with the first two levels during the psychotherapy procedure (2x2 and 3x3 puzzles). It is discovered that some subjects are goal-oriented. After three months of training during MCO, they can easily solve the easy levels and challenged themselves at the toughest level (5x5) instead of easy level (2x2). It can be concluded that they have mastered the skills of solving tasks in the game.

Their capability of solving the task is also improved in terms of duration. They demonstrated that they can solve the task in shorter time during second and third expriments (T2 and T3) compared to the first experiment (T1). Figure 5 illustrates time taken for solving task in playing *[Neuro]-therapy* game during game-based psychotherapy sessions.

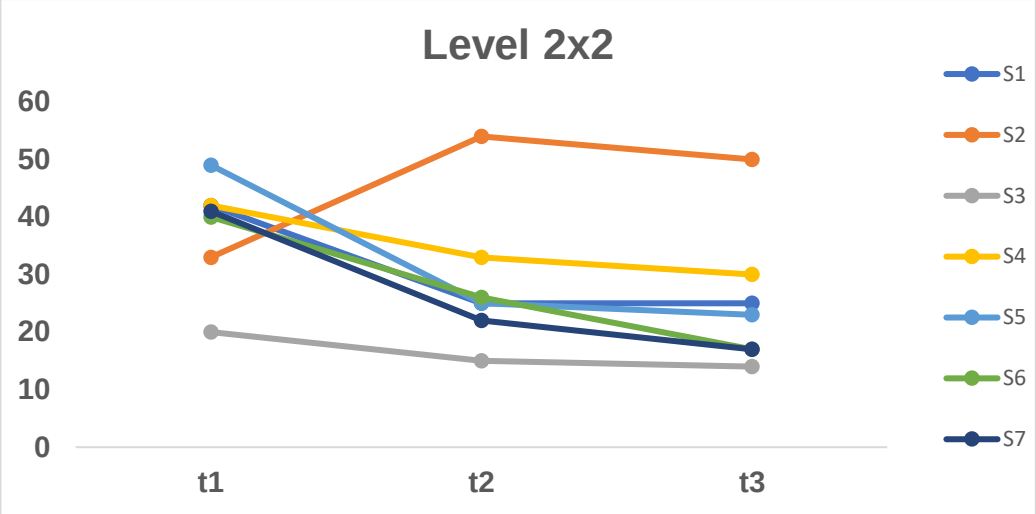

Figure 4. Time recorded for solving task in *[Neuro]-therapy* game for three sessions

To measure their performance in solving ask while playing *[Neuro]-therapy* game, time taken are recorded using time function incorporated in the game. Three data are recorded for first, second, and third sessions for all difficulty levels. Data in Figure 5 are recorded when they played the easiest level (2x2). It can be seen that; seven subjects demonstrate improvement by taking shorter time in T2 and T3. Only one subject (S2) did not show the same trend. The same improvement pattern is shown when they played bigger puzzle (3x3) size as illustrated in Figure 6. For this case, S2 remained as the outlier of the trend.

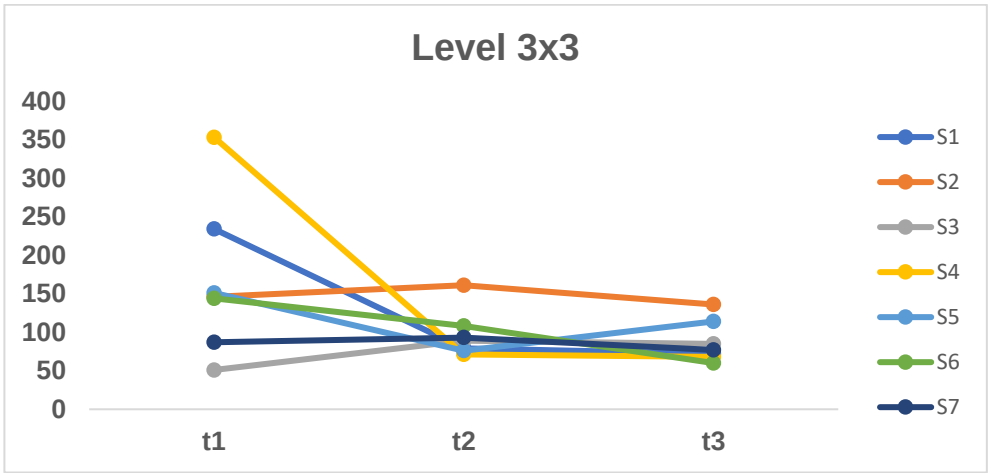

Figure 5. Time recorded for solving task in *[Neuro]-therapy* game for three sessions

IT-literacy

Subjects are elderly residing at the care-center and have less chances to use technological gadgets. Many of them do use old school phones that they are familiar with, and some don't even have phones. When *[Neuro]-therapy* game is introduced to them, it opened chances to them to use and utilize the gadgets. This research offers subjects the chances to use the technologies they do not get the opportunity before. As first timer to the gadget, it was tough for them to handle and get familiarize with it. Their hands are rigid, tense and appear to touch the screen surface with their palms instead of one fingertip. They need to be guided by holding their hands in operating the tablet.

After three months of training, they have shown a lot of improvements in terms of gadget handling. They can easily operate the tablet comfortably and also scroll across the tablet on other games during the second and third evaluation sessions. This finding shows that the elderly is making good progress in handling technology, thus suggested that their IT-literacy have been improved.

Knowledge

After three months of training during MCO, subjects have demonstrated that they have gained a lot in terms of their knowledge. They can discuss and give feedback openly about *[Neuro]-therapy* game. They can even give suggestions to improve the game, for example on difficulty of the game. They can relate their life experiences with the game, discussed, and engaged with the discussion wisely.

Tactical skills

In the beginning of game-based psychotherapy session, subjects basically did not use any tactics in solving the task. They used trial-and-error tactic, guessing, and trying their luck by merely putting puzzle pieces in any location. After undergo three months training and get familiarized with the game, it is discovered that subjects demonstrate substantial progress during post-training by solving the puzzle using self-learned techniques.

Beside analyzing the pattern on the image, they used the shape of puzzle pieces and matched it with the matching shape on puzzle base. Another tactic is by starting with outer puzzle pieces with straight lines. They assembled the outer puzzles then complete the center part. By applying this tactic, they can solve the puzzle in lesser time compared to earlier sessions. It is suggested that they have learned and discovered their self-learned tactics, thus improved their thinking and reasoning skills.

Positive attitude

Subjects demonstrate passions against the involvement of psychotherapy during the observation. Earlier in the set-up room, subjects came and waited for our arrival. It is also noted the subjects asked to be mounted in the tablet for new images for the puzzle. We have been advised that subjects have played the games on several occasions. They are also willingly volunteered to come first during the experiment. Subjects often demonstrate high perceived concentration when playing the game of psychotherapy.

By their facial expression, subjects' satisfaction may be detected. It is noticed that when they place a piece of puzzle correctly, subjects smile. It can also be seen that when the puzzle was solved for a longer time, subjects frowned. The moment subjects finished one puzzle, though, subjects chuckle happily and rejoice for their victory. Subjects also express their satisfaction with our member by telling us that in particular the difficult stage, they have successfully completed the assignment. This finding suggests that in terms of enjoyment, the psychotherapy game will lead to their emotional state.

CONCLUSION

MCO that has been declared due to COVID-19 pandemic has isolated the elderly residing at elderly care centres from outside world since there are susceptible to the virus and impacted them emotionally. *[Neuro]-therapy* game which initially been utilized as a tool in game-based psychotherapy game at RSK Bedong has become one of the alternatives for them in combatting their emotional effects due to the MCO. They have utilized the game for three months as a part of the internal activities at the care centre.

Interesting findings have been discovered and analyzed after three months of game utilization during MCO which indicate the impacts of *[Neuro]-therapy* game on elderly; task solving skills, IT-literacy, knowledge, tactical skills, and positive attitude as well as bridging digital divide. We with a believe that digital game interventions are effective at improving cognition among elderly, the interesting and positive findings can be attributed to the integration of digital game and psychotherapy for elderly, particularly those with memory disorder symptoms.

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