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**Evaluating the Effectiveness of Theory of Mind  
Training for Older Adults with and without  
Cognitive Impairments in Lebanese Nursing  
Homes: A Pilot Study**

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## **Abstract**

### **Evaluating the Effectiveness of Theory of Mind Training for Older Adults with and without Cognitive Impairments in Lebanese Nursing Homes: A Pilot Study**

This pilot study assesses the impact of Theory of Mind (ToM) interventions on residents with and without cognitive impairment in Lebanese nursing homes. The sample comprised 16 participants aged 50 years and older, with Mini-Mental State Examination (MMSE) scores classifying them into different levels of cognitive functioning. All participants initially completed a pre-test assessment in which their ToM capacities were assessed with the use of silent films and strange stories. After this, participants attended ToM training in eight sessions over the course of four weeks, with 2 sessions each week. Post-tests included the use of different strange stories and the silent film task to assess any changes in ToM abilities. The results show that participants with MMSE scores greater than 18 improved in ToM skills, illustrating that this form of training would be more effective for those with mild to moderate cognitive impairments. On the contrary, participants with severe impairments demonstrated little to no improvement, indicating the effectiveness of cognitive training programs with respect to individual needs. The results of the study support the effectiveness of ToM training as an intervention aimed at improving social cognition in older adults with mild cognitive impairment.

**Keywords:** social cognition, aging, Theory of Mind, ToM training, cognitive impairment, nursing homes

## CHAPTER ONE

### INTRODUCTION AND BACKGROUND

#### Introduction

Social cognition is the mental process through which individuals perceive, interpret, remember, and utilize information about themselves and others (Fiske & Taylor, 1991). It encompasses the cognitive mechanisms underlying our understanding of social situations, the formation of impressions, and the making of attributions about behavior (Gilbert, Pelham, & Krull, 1988). In essence, social cognition is the portal through which we enter the social world. This area of research examines how people create mental images of other people, themselves, and interpersonal connections. It looks at the mental processes that go into creating perceptions, developing opinions, and comprehending social interactions. Researchers delve on how people understand social cues, develop attitudes, and make judgments in many social circumstances by studying these mental processes (Nisbett & Ross, 1980). Social cognition is a basic element of human experience; it affects how we interact with others, build relationships, and communicate within communities and social groups. By understanding the complexities of social cognition, we can gain

deep insights into interpersonal dynamics, social behavior, and the characteristics that shape our comprehension of the social world.

In the domain of social cognition, broadly characterizing the ability to construct mental representations of the self, the other, and their relations, as means of guiding behavior, several neurocognitive and affective processes have been implicated across social contexts (Fernandes et al., 2021). An important function of social cognition is relating to behavioral control through understanding and interpreting the mental states of others. Studies on attributing mental states to oneself/others or assigning beliefs, intentions, and emotions to a person, also known as the Theory of Mind (ToM), rank the highest in the fields of social cognition. According to Green et al. (2019), Social Cognition (SC), a multidimensional theoretical framework allows individuals to mentalize the other's beliefs, intentions, emotions, and behaviors, through its diversified functions which include social perception, emotional identification, and namely Theory of Mind (ToM) (Green et al., 2008; Bellack et al., 2007; Green et al., 2019, as cited in Haddad et al., 2021). Of these processes, Theory of Mind (ToM) has been the subject of rigorous research efforts, despite its conceptual overlap with other subdomains (Happé, Cook, & Bird, 2017, as cited in Schurz et al., 2021). This construct, widely investigated in both neuropsychology, developmental, and clinical psychology, within children and younger adults, has become more rigorously studied in predicting age-related changes in the ability to attribute mental states to others and thus indicating an area of study when investigating social cognition in older adults over the past decade (Lecce et al., 2015; Rosetto et al., 2020). ToM remains important especially in the elderly age where changing ToM affects social behaviors and interaction levels that help in developing learning strategies and approaches. Studies conducted recently indicated that poor ToM is becoming more and more linked to

social exclusion that diminishes quality of life pointing to a gap for interventions (Henry et al., 2013). Given its quantifiable nature as measured by competency tasks including but not limited to the false belief tasks (Baron-Cohen, Leslie, & Frith, 1985; Wimmer & Perner, 1983), Faux Pas Recognition test (Stone, Baron-Cohen, & Knight, 1998), Reading the Mind in the Eyes (RME) test (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001), and namely the Strange Stories task (Fletcher et al., 1995; Happé, 1994), and Silent Movies Task (Devine & Hughes, 2013), these ToM skills have been identified as areas of intervention given the normal moderate decline in the fundamental skill associated with interpersonal communication and social relationships among healthy older adults (Henry et al., 2013, as cited in Cavallini et al., 2015). Thus, research efforts like that of Cavallini et al. (2015) and Lecce et al. (2017) have investigated ToM-centered intervention, ToM Training developed by Lecce et al. (2015), through conversation-based tasks performed in controlled, structured environments and measured through the aforementioned traditional and non-traditional ToM tasks. And while, ToM training efficacy has been established experimentally in healthy adults, there exists scarce evidence on ToM training efficacy within a sample of older adults within a clinical sample, namely mild cognitive impairments (MCI) predictive of Alzheimer's disease and other non-amnesic presentations predictive of different types of dementia despite Rosetto et al. (2020) pointing to ToM competencies as screening tools in evaluating successful and unsuccessful aging, particularly in association with neurodegenerative disorders and their progression. In their longitudinal investigation of ToM competencies across older adults with MCI and healthy controls, Rosetto et al. (2020) investigated the potential long-term effect of multi-stimulation intervention on ToM performance in both groups over the span of 12 months revealing that ToM competencies' ability to



discriminate between MCI and healthy controls (HC) samples, and to establish ToM competencies as outcome measures of multidimensional cognitive interventions within clinical and non-clinical older adults. These results highlight the place of these interventions at an early stage, underlining their importance for losing ToM abilities in elderly individuals whose abilities to maintain social interaction and wellbeing depends on ToM. Also in this case, it has been confirmed that ToM training effects are dependent on a number of specific cognitive domains, executive functions and memory among them, and proposed a specific explanatory mechanism for this. However, little to no research on the efficacy of ToM training as developed by Lecce et al. (2015) on socio-cognitive functioning with ToM tasks as measures of gains and maintenance has been reported. In future investigations more attention should be paid to individual differences such as the initial cognitive abilities and levels of social interaction when evaluating the outcomes of the ToM training programs. These aspects have been revealed to be critical understanding in creating solutions that are responsive to the needs of different groups in the elderly population. In this review, the literature on ToM competencies in older adults, in their affective and cognitive domains (first and second tier) within clinical (MCI) and healthy older adults, ToM training in older adults, as well as the tasks shown to be efficient at measuring ToM patterns, namely the Strange Stories and Silent Movies tasks, are explored as the current study aims to investigate the efficacy of ToM training in older adults, healthy and with a MCI diagnosis, residing in nursing homes within a Lebanese context.

### **Social Cognition and Old Age: A Complex Relationship**

Social cognition, the mental processes necessary for comprehending and interacting with the social environment, is prone to substantial alterations as people

age. Some facets of social cognition show noticeable declines, while others stay mostly unchanged.

### **Core Components of Social Cognition**

Social cognition encompasses several key components:

**Theory of Mind (ToM):** The ability to understand and attribute mental states to oneself and others (Premack & Woodruff, 1978).

**Emotion recognition:** The capacity to identify and interpret emotional expressions in others (Ekman & Friesen, 1971).

**Empathy:** The ability to understand and share the feelings of others (Batson, 1991).

**Impression formation:** The process of developing initial judgments about others based on limited information (Asch, 1946).

**Attribution:** The process of explaining the causes of events and behaviors (Heider, 1958).

### **Age-Related Changes in Social Cognition**

Despite that old age means enriched wisdom and life experience, research suggests that certain social cognitive abilities demonstrate a remarkable decline. For example:

- **Theory of Mind:** While basic ToM abilities may be preserved, older adults might experience difficulties with complex social scenarios or understanding ambiguous social cues (Henry, Phillips, Ruffman, & Bailey, 2013).

- **Emotion recognition:** Older adults may be less accurate in recognizing negative emotions, particularly subtle expressions (Ruffman, Henry, & Bailey, 2008).
- **Empathy:** While empathy may be maintained or even enhanced, specific components, such as perspective-taking, can decline (Davis, 1994).
- **Impression formation:** Older adults may rely more on stereotypes and implicit personality theories, leading to less nuanced judgments (Zebrowitz & Montepare, 1991).

It's necessary to note that there are general trends and individual differences. Factors such as cognitive reserve, social engagement, and health status can influence the extent of age-related changes in social cognition.

## CHAPTER TWO

### LITERATURE REVIEW

#### **Theory of Mind (ToM)**

Ample research across neuropsychology, clinical and developmental psychology, refers to Theory of Mind (ToM) as the ability to make sense of and predict social behavior through inferring, representing, and attributing independent mental states to the self and others which includes intentions, emotions, desires, and beliefs based upon the preliminary description of Premack and Woodruff (1978) (Rossetto et al., 2018). ToM is the capacity of a person that permits the understanding of the behavior and feelings of other people and forming an appropriate response,

which is very important for the socialization and communication of people. These research efforts both in their behavioral and neurological (neuroimaging) forms have established ToM as a multidimensional construct, and imperative socio-cognitive skill, that follows a steady, predictable development across its two defined components: cognitive and affective (Raimo et al., 2022). The cognitive dimension of ToM is the ability to apprehend and reflect on other people's thoughts and beliefs, and the affective dimension of ToM is the ability to identify and feel other people's feelings. In their work, Raimo et al. (2022), recount the literature on the cognitive component across ages 4 to 5, the onset of the ability to discern beliefs and reactions, ages 6 to 7 during which second-order beliefs develop, and for 7 years of age into adolescence and early adulthood during which third-order beliefs arise (Perner & Wimmer, 1983; Wimmer & Perner, 1985; Astington & Dack, 2008). Second-order beliefs can be defined as the awareness that one person can have a belief about another person's belief; third-order beliefs, as mental state attribution, are more nuanced in complexity than second-order beliefs. The ability to infer emotional states and feelings follows a similar developmental route according to the review of Raimo et al. (2022), with distinct years being 2 to 4, 5 to 6, 6 to 7, and 8 to 9, during which the ability to recognize facial expressions and the role of desire, identify external emotional stimuli and comprehend the roles of beliefs and memory, distinguish between felt and expressed emotions and become aware of emotional regulation strategies develop respectively (Macdonald et al, 1996; Ruffman & Keenan, 1996; Pons et al., 2004). Emotional regulation means being able to express emotions in a way that manages an emotional experience which is socially acceptable and adaptable. ToM has special relevance in the elderly as it can improve their social behavior, as well as entwine with overall mental health and well-being. This research is intended to fill in the gap

in evidence by showing the significance of ToM training for elderly population, particularly in a Lebanese society where familial and societal dynamics are likely to be much different than that of western context. And while prior research has focused on the development of this widely referenced construct across infancy, adolescence, and early adulthood, recent efforts have veered toward researching ToM within older adults, and given the aim of the present study, the following section is to explore ToM and aging, establishing such a relationship prior to delving into the primary intervention of the study, ToM training in older adults within a Lebanese context.

### **ToM and Aging**

While some, earlier research results yielded no significant differences between ToM skills in adult age groups (Castelli et al., 2010; Slessor, Phillips, & Bull, 2007), more recent efforts revealed a significant decline in ToM skills in older adults with an onset of 65 years according to Lecce et al. (2015) (Bailey & Henry, 2008; Cavallini, Lecce, Bottiroli, Palladino, & Pagnin, 2013). But because of such decline age related differences may cause changes in cognitive processing speed, efficiency of memory and neural activity. This is further established through the results of the meta-analysis of 23 datasets (1462 participants, 790 younger and 672 older) investigating the results within the literature on age differences of ToM; results of the meta-analysis showed poorer performance in older adults as opposed to younger adults collapsed across all ToM tasks (Stories, Eyes, Videos, False belief-video, False belief-other, and Faux pas) with a moderate magnitude degree of difficulty ( $r=-.41$ ) (Henry et al., 2013). The complex construct that is ToM is captured in these studies by the various tasks

utilized in this line of studies that incorporate various cognitive and affective processes. Given that the work of Henry et al. (2013) reveals larger differences in ToM tasks' performance in older adults as opposed to matched control tasks, the conceptual framework adopted in this study suggests that ToM difficulties in older adults are not secondary to non-ToM demands and instead posit implications on the mental state attributional processes in older adults. This invite as well into outlook the decline in ToM, that it is more responsive to difficulty of inferring and assigning mental states than general cognitive deterioration, hence an area of healthy adults for the purpose of this current study. Adult's age can mitigate these challenges however, simply cooperating with older adults may not eliminate some of the amenable socio-cognitive aspects of the deficits.

### **ToM Training in Healthy, Older Adults**

Associated with significant cognitive decline, aging according to Lecce et al. (2017) is characterized by deficits in major processes including but not limited to attention, processing speed, memory (working and long-term), and executive control (Glisky, 2007; Salthouse, 2009). These cognitive declines could have serious consequences including impairing daily functioning and quality of life, which in return calls for consideration and action on their understanding. ToM deficits are also implicated in such a decline as aforementioned, as difficulties like inferring mental states across social contexts, namely the complex like faux pas, misunderstanding, double bluff, and persuasion have been marked across the literature ((Glisky, 2007; Salthouse, 2009; Bottiroli, Cavallini, Ceccato, Vecchi, & Lecce, 2016; Halberstadt,

Ruffman, Murray, Taumoepeau, & Ryan, 2011; Rakoczy, Harder-Kasten, & Sturm, 2012). Explanations of such deficits might include parental misunderstanding and decreased socialization, which might ultimately worsen the health of the elderly. This decline generalized across verbal, visual-static, visual dynamic, verbal and visual static or dynamic tasks according to Henry et al. (2013), interventions to ameliorate such difficulties with interpersonal implications is necessary and comes in the form of ToM Training. The focus of the ToM training is to improve the function of deciphering nonverbal cues, which enhances the interactions of individuals and improves their general well-being. However, prior to exploring the nature of said intervention and its efficacy across older populations, background information on neuroplasticity in aging is necessary to understand its mode of action and identify possible confounding variables. Neuroplasticity can be understood as the ability of the central nervous system to modify its connections or structures in response to learning or experience, which is very relevant in this respect because such factors are critical for cognitive training in older adults. One such model, cited by Lecce et al. (2017), is the amplification model which posits that existing, individual differences in performance within older adults are amplified following cognitive training based on their respective baseline, efficient cognitive resources (Verhaeghen & Marcoen, 1996). This model says that people who have more initial cognitive resources gain more from training compared to people with less initial cognitive resources, making baseline measures more relevant. More recent studies have revealed such a correlation like that of Sandberg et al. (2015) whose findings upon investigating memory plasticity implication in cognitive training performance and maintenance in a sample of 112 older adults (M=70.9 years) revealed that baseline episodic memory, processing speed, and verbal knowledge with the latter being a predictor of

maintenance, were implicated in predicting gains whereas working memory predicted baseline performance (Lecce et al. 2017). These results emphasize the particular cognitive mechanisms that affect how effective training programs are. Prior research has also investigated the implication of executive function mediation of older adults' performance on ToM tasks like the Strange Stories task (White, Hill, Happé, & Frith, 2009 as cited in Lecce et al., 2017), On top of that, the targeted cognitive approaches could help mitigate the effects that advanced age has on the social cognitive processes such as ToM and other cognitive processes, therefore enhancing the wellbeing of the elderly. Executive functions are understood as higher order complex processes such as working memory, cognitive flexibility, and inhibition of responses, which are important for ToM performance. From there on, while the association between individual episodic memory antecedents and training gains has been established, attention to the implication of verbal knowledge as opposed to memory plasticity alone is established as predictors of intervention gains and maintenance, thus necessitating further investigation into the literature establishing the efficacy of ToM interventions, not only within a healthy older adult population but within the target population of this study: Older adults with Cognitive Impairments (CI). Targeting older adults with CI is especially useful since these individuals may present more noticeable social cognition difficulties that limit their independency and social functioning. Such interventions could greatly benefit patients' health and social functions if targeted at ToM.



## **ToM Training Efficacy**

### **Within a Healthy population**

Though ToM deficits in older adults and despite its cognitive and social implications had garnered marked attention, a prominent gap in studying interventions to improve such deficits within older adults was evident across the literature, and first addressed by Lecce et al. (2017) whose team developed a ToM training program comprised of two activities and based upon the aforementioned plasticity framework and the literature on the efficacy of cognitive interventions in limiting the decline of memory and reasoning as well as preserving cognitive function (Anand et al., 2011; Bottiroli, Cavallini, Dunlosky, Vecchi, & Hertzog, 2013; Cavallini, Bottiroli, Dunlosky, Hertzog, & Vecchi, 2008, Cavallini, Dunlosky, Bottiroli, Hertzog, & Vecchi, 2010). This program aimed to offer participants a logical and coherent structure for conducting training with the aim of enhancing cognitive and social abilities through using focused activity. To keep track of the participants throughout the training and ensure they kept their determination, the exercises were made entertaining and fun. Thus, by referencing the work of Hertzog, Kramer, Wilson, and Lindenberger (2008), Lecce et al. (2015) posited the existence of “a reserve potential” in older adults, which can be subject to enhancement through structured experiences that warrant defined skills, namely cognitive and metacognitive trainings (p. 218). This working model of ToM as not an isolated construct but a subdomain of

metacognition gave rise to the ToM training developed by Lecce et al. (2015) including a short stories and mental states verbs meaning tasks offering opportunities to reflect on the range of everyday complex mental state dynamics through narratives and target the comprehension of mental state verbs as opposed to increasing its use frequency respectively, established as a correlate of ToM (Lecce et al., 2010; Grazzani & Ornaghi, 2012). Besides, social interaction training was aimed not only at enhancing cognitive skills but also at improving interpersonal abilities through better insight into perspective taking training. Being able to have that balance between cognition and social interaction is of the essence in the general health enhancement of the aging population. This had also been showcased through the robust evidence of prior research efforts in which individual differences in ToM were significantly correlated with social experiences within the family and with peers; In other words, reduced social relationships and mental states conversations were positively correlated with ToM skills across the literature (de Rosnay & Hughes, 2006; Nelson, 2005; Peterson & Slaughter, 2006; Turnbull & Carpendale, 1999). Therefore, one cannot overemphasize the role of social environments in the acquisition and retention of ToM skills. Participating in regular social interactions and engaging in cognitively interesting conversations are important tasks for the maintenance of cognitive health and social interaction in older individuals. From there on, Lecce et al (2015) conducted intergroup comparisons on three groups: two control groups with respective interventions, physical and social contact conversations, neither of had a mental inference component, and one ToM Training group of 72 healthy older adults. Guidelines for adjustment and period of adjustment in the improvement of ToM skills structures are recommended for population-based studies seek to measure outcomes of structural deficits. The aim was to establish the correlation between ToM training

and reflection rather than social opportunity as well as investigate the generalization of these gains on transfer tasks implicating metamemory; The individual's knowledge on their memory, its utilization, and efficacy (Lecce et al., 2015). For this, a set of developed and psychometrically evaluated assessments was used, which sequentially (over time) evaluated the effectiveness of the strategies the researchers applied. The results revealed that gains were substantially higher in the ToM training group ( $d = 1.41$ ) than in the physical-conversation training group ( $d = 0.82$ ),  $t(46) = 2.29$ ,  $p = .027$ , and the social contact training group ( $d = 0.50$ ),  $p = .002$ ,  $t(46) = 3.35$  (Lecce et al., 2015) within the Strange stories task. This entire hypothecation makes sense still when the subjects of the targeted study do not do anything which is simply targeted in their studies on social and behavioral active interventions in response. Lecce et al's (2015) findings were also consistent across the metarepresentational verbal tasks and metamemory tasks (transfer tasks), with the gains of the ToM training group being significantly higher across both respectively ( $d = 0.43$ ;  $d=1.08$ ). This also corresponds to the possibility of internalizing and applying to everyday activities the received cognitive instructions aiming at pattern recognition and analysis including the ones learned from interaction with computers. Thus, in relation to the aim of this study, these experimental results not only establish the efficacy of ToM training within older adults, an area previously focused on children and adolescents across the literature (Clements et al., 2000; Hale & Tager-Flusberg, 2003; Lecce et al. 2013; Melot & Angeard, 2003), but also the efficacy of the narrative-based, conversational tasks, Strange Stories, and transfer tasks like the metamemory task in promoting ToM skills in older adults. This reinforces the argument that there can be limitations to the use of such interventions for constructivist teaching and informs on the neurological damages that some cognitive training programs may pose. Given that the correlation

between social experiences and ToM skills as well as ToM training and social functioning are empirically established in older adults through the work of Lecce et al. (2015), one population that is relevant to the aim of the study is older adults in nursing homes. It is precisely this area that is of special importance in the current research since nursing homes are usually those living situations that are associated with low levels of cognitive as well as social stimulation. Thus, an overview of the literature exploring the efficacy of ToM training within this specific social context is crucial. Such a comprehensive outlook might provide something useful regarding context specific strategies that can be adopted with the aim of increasing older adults' quality of life and improving cognitive health.

### **Within Nursing Homes**

According to Cavallini et al. (2021), as the number of older adults increases globally and with that the number of nursing homes (NHs), research efforts previously centered about establishing the efficacy of cognitive interventions and socially stimulating activities within clinical population in NHs has shifted to include healthy older adults as well taking into consideration normal cognitive decline and social involvement. By expanding this focus, the significance of taking active initiatives to preserve cognition and social activities is appreciated with the ultimate aim of enhancing the general quality of life for all the residents in NHs. Not unlike the literature establishing the prevalence of ToM skills' decline in older adults, research investigating this decline in older adults living in NHs has also yielded significant

results (Cavallini et al., 2021). One such study is the early, observational work of Washburn et al. (2003), which established social cognition and social functioning deficits in older adults based upon nurse's ratings, however, a significant gap persists within the available body of literature on ToM training within the NHs population according to Cavallini et al. (2021). This gap also points out that there is a need for such research which is focused on and would yield positive results in this identified population. In their trials, 31 older adults (10 of which are healthy), recruited from 5 different nursing homes in North Italy (inclusion criteria: the absence psychiatric or neurological diseases, cognitive impairment, depressive symptomatology, tangible incentives), were assigned to a conversation-based ToM training group or active control training group, the former based on the work of Lecce et al. (2015) referenced above in which participants were subject to a pre-test, underwent 1 hour trainings in a controlled room within the NH, and post-tested on ToM tasks. The environment created through the use of these structures as well as the setting of boundaries helped to ensure that the findings were valid and reliable. The findings of Cavallini et al. (2021) reveal that even after adjusting for baseline performance, the conversation-based ToM training group showed significantly better performance on ToM practiced tasks compared to the control group ( $p < 0.001$ ). These enhance and suggest the possibility of conversation-based ToM training, as cognitive rehabilitation therapy in older patients residing in nursing homes. However, no predictors upon regression analysis were significant and in turn could be implicated in ToM task performance prediction. This picture suggests that there are many variables that affect ToM performance, while covering the variables can suffice presents the need for further research on these predictors. This study, while not without its limitations warranting further research on individual predictors of ToM task performance in a bigger sample,

thus requiring replication studies, preliminary evidence of ToM training efficacy within a healthy older adult population residing in NHs is substantiated serving as a theoretical and experimental basis for the study at hand. Future research should aim to incorporate a larger and more representative sample, in order to corroborate these findings and develop their application in a more efficient way, especially, concerning the older population in NHs.

### **NH Residents within a Lebanese Context**

Investigating the efficacy of ToM training in a population of older adults within NHs is of particular relevance to the Lebanese context. According to Adra et al. (2019), Lebanon houses the largest population of older adults (65 years old and over) within the region, an approximate 9% of the population in 2015 (Sibai, Rizk, & Kronfol, 2015). This trend in the population makes it imperative to find a fit for purpose intervention that is tailored to this growing population that has certain cognitive and social spheres of functioning that require specific. This not only reinstates the aforementioned attention needed at the level of older adult social and cognitive functioning and in turn wellbeing particularly as Adra (2019) posits that nursing homes in Lebanon, though understudied within the literature, are steadily “becoming an alternative formal means by which professional care is provided to the rapidly growing, ageing population” (p. 1). The trend of migrating into formal care facilities is, however, in step with wider socio-economic changes and calls for the application of the best practices in the care of the institutions’ inhabitants. And according to Paddock, Brown Wilson, Walshe, & Todd (2018), NH residents

experience a prominent disconnect from their social networks, familiar routines, meaningful belongings, and symbols of their identity which as aforementioned is implicated in social cognition decline and in turn ToM skill deficits warranting intervention (Adra et al., 2019). This break in the positive feedback loop can result in feelings of alienation and depression among others, which may worsen the mental health of the residents making it clear why such improvements must be made. The work of Doumit and Nasser (2010) investigated the wellbeing of older adults within Lebanese NHs through a quasi-experimental approach with a sample of 220 normally functioning elderly respondents recruited from 33 nursing homes. They mentioned that keeping NH residents socially active and stimulated cognitively is critical to retaining their mental health and quality of life. The results corroborated the engagement model of Nora and Cabrera (1996) establishing a connection between older adults' quality of life and social connection within the construct of the organization, namely the NH itself thus implicating social and cognitive functioning in older adults' wellbeing within NH (Doumit & Nasser, 2010). These associations provide a sound rationale for the elaboration of ToM training for the residents of Lebanese NHs alone. Thus, more recent research centered about social cognition of older adults within Lebanese NH, namely ToM skills within this population, both healthy and with cognitive impairments is necessary. This type of research could also aid in developing integrated care approaches aimed at improving cognitive functioning and social activities for the benefit of older people residing in Lebanese NHs.

## **Social Cognition and Cognitive Impairments (CI)**

### **Mild Cognitive Impairment (MCI) and ToM deficits**

A clinical condition characterized by cognitive decline with a magnitude greater than the expected deficit given an individual's age and education but not notably impairing to daily life functions, Mild Cognitive Impairment is often a stable, clinical representation of the prodromal phase of dementia (Bora & Yener, 2017). This distinction is important because it shows how MCI is an in-between condition; that is, it does not quite resemble normal aging, and neither is one in the stage of progressive cognitive disorders such as dementia. This clinical condition's presentation can also be Amnesic, Amnesic MCI (aMCI), and has been established through the literature as a predictor of Alzheimer's Disease (AD) (Yi et al., 2020). Most importantly, the recognition of the specific aMCI subtype is especially critical because it allows starting proactive measures to prevent or slow down the onset of AD. Yi et al (2020), cite the work of Terry et al. (2015), whose meta-analytic findings provide evidence of the neuro-basis of such a correlation between aMCI and AD, thus explaining the implication of aMCI in early diagnosis, intervention, and treatment plans, relevant to this study specifically. This appeal suggests that there should be new approaches that use cognitive and social rehabilitation efforts in a comprehensible manner to arrest the effects of aMCI. Given the pre-established correlation between social cognition, ToM, and interpersonal functioning, and in turn the correlation between ToM impairment



and psychosocial difficulties across the present review, recent efforts not unlike that of Yi et al. (2020) to investigate the evidence on ToM deficits within individuals affected by aMCI are imperative. The results of the meta-analysis of the 36 included studies showcase a significant correlation between ToM deficits and aMCI diagnosis: ToM performance of aMCI patients was significantly impaired ( $d = 0.65$ ) compared with healthy controls (HC) and no significant correlation between-study heterogeneity was reported ( $I^2 = 13.74\%$ ) with impairments across both cognitive ToM ( $d = 0.44$ ,  $CI = 0.22$  to  $0.66$ ,  $z = 3.88$ ,  $p < 0.001$ ) and affective ToM ( $d = 1.12$ ,  $CI = 0.75$  to  $1.49$ ,  $z = 5.96$ ,  $p < 0.001$ ) in the subgroup analysis of patients with aMCI (Yi et al., 2020). These results suggest that ToM interventions may help aMCI patients in preserving cognitive and emotional processes, with some of them being enhanced through practical engagement.

Yi et al. (2020) revealed a similar correlation between AD diagnosis and ToM task deficits, particularly the complex tasks like the Faux Pas Recognition Task ( $d=1.26$ ), with a significant effect size of overall ToM dysfunction in AD being  $d=1.45$ . These effects are large enough to suggest that these applications have usefulness for both diagnosing and the rehabilitation of ToM skills in these individuals.

The effect size for different aspects of social cognition, namely ToM performance, deficits in healthy controls as opposed to individuals (older adults) with MCI had also been previously investigated through the work of Bora et al. (2017). Their study provides a general picture of the available knowledge on the impact of MCI on social cognition and argues the need for cognitive therapy to commence at early stages and continue through into late stages. In this meta-analysis in which 17

studies with a sample of 513 (55.6% females) individuals with MCI and 693 (60.5% females) healthy controls were included, 13 of which included only aMCI, results revealed ToM impairment ( $d = 0.63$ ) in MCI with a medium effect size range and 2 of the 17 studies pointed to a significant association between MCI and second-order ToM tasks, the more taxing of the two (Bore et al., 2017). Such observations make it clear that focused programs attempting to train ToM do have positive effects in many parts of the working memory especially for more complex tasks. Moreover, the findings point to baseline individual deficits on ToM performance: multidomain aMCI was correlated with more severe social cognitive deficits as opposed in older adults whose cognitive deficits were widespread beyond memory problems alone (i.e executive dysfunction) (Bore et al., 2017). The evidence points that such treatment strategies be devised aiming at the specific cognitive profile of the individual suffering from aMCI, particularly zoning in on broad domains of cognition when required. Although the research efforts of Bora et al. (2017) establish the significant association between an aMCI diagnosis and social cognition and ToM deficits, the predominantly female sample, as well as the age difference between individuals with MCI (older adults) as opposed to the younger HC, all point to potential confounding variables in investigating the efficacy of ToM training in older adults within Lebanese nursing homes, with and without MCI namely thus far, gender, age, baseline verbal knowledge, and multi or single domain MCI diagnosis.

Given the multidimensional aim of this study to investigate the efficacy of ToM training in older adults living in Lebanese nursing homes, with and without MCI, it is imperative to review the literature on trials investigating the nature of ToM deficits within a population of older adults with MCI. In this way, this review will

assist in understanding how training regimens can be focused on specific issues, further clarifying problems that require introduction in this population. One particular study conducted by Rossetto et al. (2018) explored the cognitive and affective domains of ToM deficits in participants with amnesic Mild Cognitive Impairment (aMCI=16), early stage of Parkinson's Disease (PD=14), and healthy controls (HC=18). This way of making comparisons sheds new light on the understanding of how different neurodegenerative disorders and adaptations affect grasping ToM, hence proving the necessity of interventions that are appropriate to the specific condition. The experimental design was based on the established neural distinction between cognitive and affective ToM thus investigated the different patterns of ToM impairment as a function of neurodegenerative condition (Rossetto et al., 2018). Such distinctions are critical for developing nuanced interventions as they will effectively target plastic changes within each condition. An overview of the existing literature reveals that while the majority of studies highlight a significant impairment in the cognitive dimension of ToM, specifically in tasks with a high cognitive load such as second-order false belief tasks (Bora, Walterfang, & Velakoulis, 2015; Kemp et al., 2012; Poletti, Enrici, & Adenzato, 2012), only a few studies according to Rossetto et al. (2018) have investigated ToM skills in the prodromal stage, MCI diagnosis, that predicts an increased risk of AD onset in its amnesic condition and non-amnesic condition which predicts other non-AD dementias (Bora & Yener, 2017). This gap in research shows that more research needs to be aimed at ToM deficits in early stages of cognitive decline as these are likely to result in earlier and more effective treatment possibilities. Moreover, the work of Rossetto et al. (2018) was aimed at dispelling the discrepant evident on ToM cognitive and affective decline in people with MCI as studies like that of Dodich et al. (2016) did not report significant results.

Heterogeneity of this kind is important in understanding ToM impairments and the development of diagnostic and therapeutic approaches explaining such inconsistencies would ideally help in the understanding of ToM deficits and in helping the development of accurate intervention and prevention settings. Thus to explore the patterns of ToM difficulties in a clinical population of individuals with MCI, a sample of 48 participants were recruited, 16 of which were outpatients diagnosed with aMCI (aMCI group: mean [SD] age: 75.88 [3.65] years; range 67–80 years; male:female ratio 8:8; mean [SD] education: 11.81 [2.40] years), 14 of which were outpatients with Parkinson's Disease (PD) (PD group: mean [SD] age: 68.21 [7.96] years; range 52–78 years; male:female ratio 13:1; mean [SD] education: 14.21 [3.44] years), and 18 were healthy controls (HC group: mean [SD] age: 74.06 (3.39) years; range 69–80 years; male:female ratio 8:10; mean [SD] education: 12.00 [3.24] years). Participants within this study were administered a cognitive assessment (Montreal cognitive assessment) (MoCA; Santangelo et al., 2015) a traditional paper–pencil ToM evaluation which included the Deceptive Box Task (Perner, Leekam, & Wimmer, 1987), Look-Prediction and the Say-Prediction tasks Astington, Pelletier, & Homer, 2002; Liverta Sempio, Marchetti, Castelli, Lecciso, & Pezzotta, 2005; Sullivan, Zaitchik, & Tager-Flusberg, 1994), RME test (Baron-Cohen et al., 2001), and a selection of four stories from the Strange Stories task (Happé, 1994; Happé, Brownell, & Winner, 1999; Italian translation by Mazzola & Camaioni, 2002), as well as the Yoni Task (Gianni task in its Italian form) which is a computerized task that assesses both the cognitive and affective ToM domains through 98 trials, requiring participants to make mental inferences on Yoni's states (i.e: the affective “Yoni likes. . .”; the cognitive “Yoni is thinking of. . .”; physical control “Yoni is close to. . .”) (Rosetto et al., 2018, p. 770).

Results of this experimental design revealed significant differences in the most advanced tasks, RME and Strange Stories tasks as opposed to the Deceptive Box task, the Look-Prediction task and the Say-Prediction, with significant between-groups differences respectively ( $\chi^2 = 11.71, p < .005$ ;  $\chi^2 = 6.87, p < .05$ ). The differential impact of MCI on the performance of various ToM tasks leads to the conclusion that some tasks may provide a more sensitive measure of ToM deficiencies and offer a fundamental level of assessment of ToM deficits. Moreover, pairwise comparisons showed that aMCI group had lower performance than the HC group both on the RME test and on the Strange Stories task whereas no significant differences were revealed between the PD group and the HC group (Rosetto et al., 2018). It follows that an aMCI condition will yield a different ToM deficit picture than the other common neurodegenerative conditions including in the case of PD which emphasizes the potential of tailored therapies. With regards to the Yoni task, Rosetto et al's (2018) findings reveal a significant between-group difference in the total score of the Yoni task (total score,  $\chi^2 = 8.95, p < .05$ ) with the aMCI group scoring significantly lower than the control group in both domains but not in the physical domain; These deficits in performance apply to both first-order cognitive items (COG1) and second-order cognitive items (COG2). There exists a wide range of variability within the performance of various ToM tasks pointing toward the complexity of ToM deficits among individuals with aMCI and thus the variation in assessment tools. This study further establishes the pattern of ToM deficits in adults with MCI, further providing a framework for the study at hand and guiding the selection of the ToM tasks, the complex as opposed to the simple requiring more cognitive demand, despite significant limitations to the paper and pencil tradition ToM tasks. This information

will inform the development of specific ToM training aimed at the delayed or stopped cognitive decline in older people with MCI. Thus, a review of the aforementioned tasks, namely the Strange Stories Task is necessary. The study will guarantee that the appropriate and better-suited tasks are included in the training program making it more useful.

### **ToM Task: Strange Stories**

According to White et al. (2009), the Strange Stories Task in its original form included 24 stories, and an addition set of six physical control stories (Happe, 1994). These narratives were constructed to include many social situations of a more or less common nature, which makes the task more universal and complex in estimating ToM capabilities. These sets later developed by Fletcher et al. (1995), 8 mental states stories and 8 physical control stories were selected with the former implicating ToM processes like the understanding of the double bluff, persuasion, misunderstanding, and white lie, in addition to 8 unlinked sentences which required participants to utilize recall processes (White et al., 2009). This selection aimed at achieving a balanced assessment able to discriminate understanding of the mental state and the general level of cognitive functioning. Thus, the Strange Stories task included in the body of research referenced above, is more complex than its ToM task counterparts as it requires attention to sentence meaning, answering questions, memory, implicit information integration, and mentalization through the presentation of controlled

stimuli. This complexity allows for a more fine-grained assessment of an individual's ToM capabilities, in a way that simpler tasks may not convey necessarily.

Following its conceptual definition, a review of efficacy of the Strange Stories task in measuring ToM abilities is crucial. Evaluating its efficacy ensures that the task continues to be an effective and useful measure of ToM used with various populations. The work of White et al. (2009), investigated the scope and limitation of three sets of the strange stories developed by Fletcher et al. (1995) within a sample of 23 high-functioning adults and 39 children with an autism spectrum disorder (ASD) diagnosis. Their study is focused on understanding the influence of constant alterations in cognitive profiles on the outcomes of the Strange Stories task, which serves as a reference point when assessing other populations. In addition to the Strange Stories, the participants were also administered first-order ToM tasks namely the false belief tasks, Sally-Ann (Baron-Cohen et al., 1985), Smarties (Perner, Leekam, & Wimmer, 1987) as well as two second-order false belief tasks, Ice Cream Van (Baron-Cohen, 1989) and Birthday Puppy (Sullivan, Zaitchik, & Tager-Flusberg, 1994). Whereas the adult group was administered the Sally-Ann task and a second-order Coat Story task (Bowler, 1992) (White et al., 2009). These activities were selected in such a manner so as to test the complete range of ToM preferably without

changing cognitive load too much. Results of this study revealed that while children with ASD failed tasks like the false belief task, the second-tier task like the Strange Stories revealed variance in impairment levels with the greater impairment being at the level of the mental state stories as opposed to the physical despite poor performance in both ( $p < .001$ ,  $g_2 = .50$ ) (White et al., 2009). This difference illustrates the task's ability to embrace a variety of components of ToM, so it can be

also effective in detecting whether and what exact deficit exists. And despite not controlling for verbal ability shown to be implicated in ToM deficits, this study reveals that while ToM deficits in children with ASD are general across tasks, the Strange Stories task is sensitive to exploring deficits in mentalizing abilities (White et al., 2009). This fine-tuned nuance reveals that there is a need to use simple tasks to assess ToM since there are different patterns of impairment for fine grained analyses of these tasks. Based on the aforementioned, further research exploring the performance of other groups, clinical and non-clinical, and of older age groups on the Strange Stories task is necessary thus aligning with the aim of the current study. This has implications in the fact that it will save the need to look to the center every time thus enabling further research in order to broaden these conclusions and the scope of offering ToM assessment. This is also relevant as the majority of the sample, children and adults, is middle-class and Caucasian, necessitating further research within a diversified sample, namely the Lebanese. In this sense, such diversification will also guarantee that the task is appropriate to the different contexts that will be employed boosting its effectiveness in the global environment.

### **ToM Task: Silent Movies (Transfer Task)**

Devine and Hughes (2013) posited the need for a new task, complimentary to the Strange Stories task with a focus on an individual's understanding of beliefs in complex social scenarios. Their reason was to create a task that investigates ToM skills in a less static and more realistic environment which can be believed to cover



more mentalizing skills. This analogue task, assess participants' ability to explain the behavior of classic silent film characters (Harold Lloyd's comedy, *Safety Last*) through implying their understanding of beliefs and desires across the short clips played. In this task, dialogue is absent as it involves watching mute films, pushing the audience to deduce thinking through movement and context. Devine and Hughes (2013) reason the need for such a task to complement the explicit presentation of mental state stories in the *Strange Stories* task as opposed to the implicit, visual presentation of stimuli within the *Silent Films* task thus enabling a reliable assessment of individual differences and the ability to make inferences which is more challenging. This implicit strategy enables assessing ToM skills in a more realistic situation that social life is whereby, social interactions are quite spontaneous and social cues are more often than not non-verbal. 230 participants attending primary and secondary schools within the UK were recruited resulting in a sample of 40 children (50% male) across 5 age bands whose affluence and verbal ability were controlled and were administered a battery of tests as well as the 5 short clips of the *Silent Film Task*. These sets of controlling variables ensured that the findings would not be muddled with other unrelated factors emanating a clear depiction of the participants' ToM competencies. The study findings revealed that items from the *Strange Stories* and *Silent Films* tasks loaded onto a single theory-of-mind latent factor and pointed to the effect of age and gender in the ToM in older children and adolescents (Devin and Hughes, 2013). These findings indicate that ToM skills are subject to development and stress the need of taking age and gender into consideration when evaluating ToM skills. Thus, this study further informs the current study as it establishes the complimentary use of dual assessment of second-tier ToM skills within the target population, older adults in nursing homes with and without MCI, as well as exploring

the efficacy of this complimentary administration in evaluating the gains of the ToM intervention in a sample of Arab, Lebanese, older men and women of varying verbal knowledge baselines. This dual evaluation mechanism will facilitate a wider scope of the assessment of the ToM improvement tracking, covering both overt and covert understanding of other minds' factors. It will also help understand how to adapt ToM training in different cultures and cognitive bases.

### **Mini-Mental State Examination test (MMSE)**

The mini mental state examination, which was developed by Folstein, Folstein, and McHugh (1975), is one of the most popular 30-point instruments used to assess mental status among the population. Succeeded, with its ease of use and short time, in both practical application and in the research aspects, it allows the rapid assessment of cognitive impairments. It assesses a range of cognitive domains including temporal and spatial orientation, immediate recall, short-term memory, language abilities, and the ability to follow simple commands. This test is short and quick lasting approximately 5-10 minutes, objective and informative regarding the cognitive functions in the brain. The said quality of realization, in particular, is useful when working in conditions where time and resources are limited.

The outlines of this research show how to use the Mini Mental State Examination by its sections – orientation, registration, attention and calculation, recall, and language.

Under the orientation section one checks the subject's ability to tell about the current time and where one is at this present moment, under registration the participant is required to repeat the named objects, under attention, and calculation people are asked to count forwards/ backward and do simple operations like spelling, under recall the participant is requested to recall a few things said within a short period of time, under language one is required to name objects, phrase repetition, command responding and even out writing one sentence (Folstein et al, 1975). They all focus on separate processes in order to make a complete assessment of an individual's cognitive abilities.

Adequate scores on the MMSE stand from zero to thirty with higher scores indicating better cognitive function. Individuals with no cognitive decline are routinely thought not to score lower than 24 whereby cognitive decline if any, is to be mild in a range between 18 – 23 and moderate to severe impairments when below 18 (Tombaugh & McIntyre, 1992). The employ of these scoring ranges creates room for an easy categorization of cognitive status, and hence the right intervention strategies. For the purposes of the current study, only subjects with mild to no cognitive impairment (MMSE>18) were included in order to enable assessment of Theory of Mind (ToM) training in a group of patients with mild if any, cognitive decline.

Targeting individuals with MMSE scores greater than 18 is important since these scores also communicate that the individuals should be able to actively participate in the ToM training exercises. Subjects with mild cognitive impairment, who fall above this cut off, should still benefit from ToM training since they already have enough cognitive resources to understand and think about complicated social situations and

their indicators. This selection criterion makes it possible for the study to recruit individuals who do not only have the ability to take part in the training but also those who are more likely to show objective changes in ToM after. Applying MMSE as one of the tools within this current study increases its capability of measuring accurately the effect of ToM training on people with mild cognitive impairments, thereby making it easier to understand their specific needs and the ways such interventions can be fit to meet their specific needs (Folstein et al., 1975; Tombaugh & McIntyre 1992).

The practical advantages of the MMSE are enhanced by its high degree of acceptability and good psychometric properties including good test-retest reliability and validity in both clinical and research activities (Folstein et al, 1975). It is ensured by the fact that there is reliably recorded data on the cognitive changes over time which can be useful in longitudinal studies. It is helpful in determining the extent of change in cognition over a period of time and also in determining the extent of the effects of therapeutic interventions. In this case, the MMSE as an inclusion criterion facilitated the formation of a narrow target population and thus made it possible to assess the effectiveness of the ToM training in older persons with mild to no cognitive impairment. This organized manner improves the quality of the study and adds to the growing evidence of the efficacy of ToM training for those with mild cognitive impairment.

## **Problem Statement**

Research on the effectiveness of Theory of Mind (ToM) training programs for older persons is lacking, despite the acknowledged link between ToM decline and aging, especially within clinical populations like Mild Cognitive Impairment (MCI) within the context of Lebanese nursing homes. While previous studies have established the effectiveness of ToM training in enhancing cognitive and social abilities in healthy older adults, its impact on individuals with MCI residing in nursing homes remains largely unexplored. In addition, the potential mitigating effects of individual differences, such as baseline cognitive capacities and social engagement, on the results of ToM training within this population are yet to be further studied.

## **CHAPTER THREE**

### **AIM AND RESEARCH HYPOTHESES**

#### **Aim**

The aim of this study is to investigate the efficacy of Theory of Mind (ToM) training on older adults with and without Cognitive Impairment (CI) residing in Nursing Homes (NHs) within the Lebanese context. Previously documented within the literature to be effective as a mode of intervention in healthy older adults subject to normal decline in socio-cognitive processes, one of the main aims of this study is to

investigate efficacy and mechanism of ToM skill building through ToM training within older adults with and without cognitive impairments, given the social and

cognitive functioning implications of the diagnosis necessitating early diagnosis and intervention. The study also aims to replicate the intervention developed by Lecce et al. (2015) within a Lebanese context given the rise in the older adult population and in turn NH residents. The gains and maintenance of the aforementioned intervention, ToM training, is to be evaluated through the Strange Stories and Silent Film tasks, practice and transfer tasks, therefore exploring the efficacy of these tasks within a Lebanese context.

## **Research hypotheses**

**Research questions and hypotheses.** Specifically, the current study seeks to address the following research questions:

**Research question 1.** What is the efficacy of Theory of Mind (ToM) training on improving ToM skills in older adults with and without cognitive impairments residing in nursing homes within a Lebanese context?

**Hypothesis 1.** Theory of Mind (ToM) training will result in significant improvement in ToM skills in older adults with and without cognitive impairments residing in nursing homes within a Lebanese context.

**Research question 2.** Are there differences in the improvement of ToM skills between older adults with cognitive impairments and those without cognitive impairments following ToM training?

**Hypothesis 2.** Older adults without cognitive impairments will show greater improvement in ToM skills following ToM training compared to those with cognitive impairments.

**Research question 3.** How do the improvements in ToM skills vary between the practiced task (Strange Stories) and the transferred task (Silent Movies)?

**Hypothesis 3.** The gains from ToM training will be more significant in the practiced task (Strange Stories) compared to the transferred task (Silent Movies).

**Research question 4.** To what extent does ToM training improve both practiced and transferred ToM tasks in older adults with and without cognitive impairments?

**Hypothesis 4.** Participants in the ToM training group will show a significant improvement in both practiced and transferred ToM tasks post-training, regardless of their cognitive impairment status.

## CHAPTER FOUR

### RESEARCH METHODOLOGY AND METHODS

#### Participants

The study sampled 16 participants comprising of 2 males and 14 females. Participants were recruited from two nursing homes located in the Bekaa region in Lebanon, specifically in Zahle city. Participants were subclassified as older adults, with mild cognitive decline versus those without mild cognitive decline.

The age of the participants ranged from 53 to 93 years, whereas the average mean age was 74.56 years ( $M = 74.56$ ,  $SD = 13.34$ ). Participants had different education levels where the maximum number of years of education was 15 and the minimum was 0 ( $M = 9.5$ ,  $SD = 4.63$ ). There were also participants with education history of no formal education - 2 participants, primary - 2 participants, secondary - 4 participants, and bachelor and higher education - 5 and 3 participants accordingly.

A number of participants were single 6 participants, 1 married, 8 widowed, and 1 divorced. Participants tended to be residents of nursing homes for a period snowfall for various periods of time from 2 to 14 years with an average of 5.5 years ( $M = 5.5$ ,  $SD = 3.88$ ). Their work occupation before retirement encompassed teacher, engineering, and housewife and other fields.



Half of the people did not need any motor help (8 participants) and the other half required motor help (8 participants). For people with motor help, the types of help were: Walking cane: 3 people, Walker: 3 people and Wheel chair: 2 people. Some additional details about this information were useful in having a background of how much help did the participants require still for physical assistance.

Participants were included in the study using the following inclusion criteria: Mini-Mental State Examination (MMSE) results were a determinant of participant selection. Older adults with scores above 18 on the MMSE test were only included. The MMSE scores ranged from 20 to 29, with a mean score of 24.75 (SD = 2.93). This criterion ensured that participants had varying levels of cognitive function, allowing for the assessment of Theory of Mind training effectiveness across different cognitive statuses.

**Table 1.** Descriptive statistics of the participants.

	ToM training ( <i>n</i> = 16)
Participants characteristics	
Age	74.56 (13.34)
Years of education	9.50 (4.63)
MMSE score	24.75 (2.93)

*Note: scores in parenthesis refer to standard deviation.*

## **Study design**

In this pilot study, 16 older adults with no to mild cognitive impairments from two different nursing homes in Lebanon, namely Bekaa-Zahle region were recruited to participate in order to examine the efficacy of the ToM training. The first week was reserved for the pre-test assessment procedure which included both Strange Stories and Silent Movies task. Then the intervention of eight sessions was administered over a four-week period, with two sessions being held weekly. Each session conducted included structured and conversation-based activities in the purpose of improving ToM abilities. The following week was reserved for the post-test assessment which included a different set of the Strange Stories task along with the Silent Movies Task. The design used allowed for a comprehensive evaluation through a thorough assessment process of the ToM training's effects on older adults with no to mild cognitive impairments.

The study was based on a predetermined set of steps regarding assessments and treatments aimed at measuring the effects of Theory of Mind (ToM) training on older adults. The participants were given the Mini-Mental State Examination (MMSE) for baseline assessment of cognitive function and this was used to screen participants for eligibility to the study. It was decided that only participants with MMSE scores of above 18 would be included and this was done to ensure that the participants had mild or no cognitive impairment. After the MMSE took place, a week-long pre-test was done where the Strange Stories and Silent Movies tasks were done in succession. These tasks served to assess the level of ToM abilities in the participants providing a basis for comparison with both the baseline and the effects of the intervention.

After just completing the pre-tests, they underwent the intervention with ToM, engaging in eight training sessions on a four-week schedule, with two training sessions per week. The aim of each training session was to promote and develop the cognitive and affective components of the ToM using structured and active guided discussions. At that point, participants were given post-tests across another week, and the series of post-tests was similar as in the pre-tests comprising of new sets of Strange Stories and the same Silent Movies tasks that had been conducted during the pre-tests consecutively. Usage of other set of Strange Stories during the post-test on the other side ensured that the evaluation was assessing the ability to transfer the ToM learned in the training into the new circumstances rather than simple recitation. This overall strategy helped to adequately assess the impact of the ToM intervention in improving social cognitive functioning in older adults with varying levels of cognitive function at baseline.

## **Measures**

Given that the study was held in a Lebanese context and with Lebanese older adults, all the material and measures included in the study, the intervention modules, the Mini Mental State Examination test,

the Strange Stories task, and the Silent Movies task were translated into Arabic. The validated Arabic version of the Mini Mental State Examination (MMSE) test was retrieved from “An Arabic Version of the Mini-Mental State Examination for the

Lebanese Population: Reliability, Validity, and Normative Data” by El-Hayeck et al. (2019).

### **Mini Mental State Examination test**

The Mini Mental State Examination test, or MMSE, is a paper-and-pen based test consisting of thirty questions. This test is an assessment of cognitive functions including the following areas of functioning: attention and orientation, memory, registration, recall, calculation, language, and the ability to draw a complex polygon (Folstein 1975, as cited in Arevalo-Rodriguez et al., 2021). The attention and orientation section contains questions about time and place for example: “What year is this?”, “what country are we in?”, each correct answer is given one point by the examiner, a total of ten points is given in this section divided into five points for questions related to time and five points for those related to place. With that being said, the participant can score a maximum of 10 points in this section. In the registration section, the examiner names to the patient three unrelated objects, it should be done clearly and slowly and then asks the participant to repeat them, in the Arabic version of the test the three words were: “flag, chair, key”. The examiner keeps on repeating the words until the participant memorize the three of them, however, while scoring, the first answer is to be scored. The examiner gives the participant one point for each correct word, that makes it a total of three points to this section. In addition, the examiner should inform the participants that they must memorize the words because they will be asked to recall them in a later section. The following section is the calculation section. In this section, the participant is asked to

subtract seven from one hundred, and to keep subtracting seven until they reach five subtractions, the examiner asks the participant to stop after five responses. An alternative task is to spell the word “world” backwards. In the Arabic version used, the participants were asked to spell the word “Beirut” backwards. In the calculation task, the numbers given by the participant are written down and one point is given for each correct subtraction. In the spelling backwards task, one point is given for the correct position of the letter for example: “dlrow” is given five points and “dlorw” is given three points (three letters in their correct position). If the participant can do both tasks, the higher score between the two scores given is registered. The participant can score a maximum of five points in this section. Then, there is the recall section, where the participant is asked to recall the three words memorized earlier. The participant gets one point for each word recalled correctly regardless of their order. The participant can score a maximum of three points in this section. After this section we have the language section. In this section, we have five parts: naming, repetition, command, reading and writing (Folstein 1975). In the naming part, the examiner points out a wristwatch and ask the participant to name it and repeats the same with a pencil. A one point is given for the correct answer (“watch” and “wristwatch” are acceptable whereas “clock” and “time” are given zero points, “pencil” is correct whereas “pen” is given zero point). In the repetition part of this section, the participant is asked to repeat the following phrase after the examiner: “No ifs, ands or buts”. The participant is given one point for an exact correct repetition only, example: “No ifs or buts” is given zero points. In the command part, the participant is given a blank paper and is asked to follow the instructions of the examiner. The examiner asks the participant to take the paper in his left hand, to fold it in half with both hands and to place it on the floor. The examiner must give the whole instructions at once

and then the participant pursue to follow them. One point is given for each instruction executed correctly. The participant can score a maximum of three points in this part. Next is the reading part, where the participant is given a paper written on it “close your eyes” and is asked to do what is says. If the participant just reads what is written, the examiner repeats the instructions up to three times by saying “read the words on this paper and do what it says”, one point is given only if the participant closes eyes. The last part of this section is the writing part where the participant is asked to write any complete sentence, the sentence must make sense and must contain a noun and a verb. One point is given if the participant gives a complete sentence that makes sense, containing a noun and a verb, and ignoring the spelling errors. In the whole language section, the participant can score a maximum of eight points. In the last section of the test, the ability to draw a complex polygon, the participant is asked to copy a drawing of two intersected geometrical shapes. One point is given if the following two criteria are met: two shapes with five sides each and an intersection of them. The participant can score a maximum of thirty points on the whole test.

The Mini Mental State Examination (MMSE) test was used in this study for inclusion criteria. Only participants who scored above 18 were included, as these participants were considered with no to mild cognitive decline.

### **Strange Stories task**

The Strange Stories task is a set of stories of situations about everyday life where it happens that people tend to say things while meaning something else, the Strange Stories Task in its original form included 24 stories, and an addition set of six

physical control stories (Happé, 1994). Fletcher et al. (1995), later developed this original set by selecting eight physical stories and eight states stories implicating ToM processes like the understanding of the double bluff, persuasion, misunderstanding, and white lie, in addition to eight unlinked sentences which required participants to utilize recall processes (White et al., 2009).

In our current research, Strange Stories task was administered both as a pre-test and as a post-test assessment. In the pre-test assessment we administered six sets of stories in the following sequence: 1- misunderstanding, 2- irony, 3- persuasion, 4- misunderstanding, 5- persuasion and 6- irony/ sarcasm. Participants' responses were scored using the coding scheme refined by White and colleagues (2009). One example of a misunderstanding story: "Late one night, Mrs. Peabody is walking home. She doesn't like walking home alone in the dark because she is always afraid that someone will attack her and rob her. She really is a very nervous person! Suddenly, out of the shadows comes a man. He wants to ask Mrs. Peabody what time it is, so he walks toward her. When Mrs. Peabody sees the man coming toward her, she starts to tremble and says, "Take my purse, just don't hurt me please!" (White et al., 2009). After telling the story to the participant, one question about the story was asked, example: "why did Mrs. Peabody say that?". The answer to the question requires the ability to make inference on characters' mental states. According to Happé, 1994; as cited in White et al., 2009, a full score of two points is given when the participants in their answers understand and explicitly refer to mental states underlying a behavior, one point is given for a partially correct answer, implicit and factual answers that do not refer explicitly to mental states, and 0 points for incorrect answers with reference to irrelevant or false facts. Going back to the previous example, full score of two points for reference to her belief that he was going to mug her or her ignorance of his

real intention, one point is given for reference to her trait (she is nervous) or state (she is scared) or intention (so he would not hurt her) without suggestion that fear was unnecessary, and 0 points for factually incorrect/ irrelevant answers; reference to the man actually intending to attack her (White et al., 2009). Participants can score a maximum of twelve points on this task.

In the post-test, a different set of stories was used in the following order: 1- misunderstanding, 2- irony/ sarcasm, 3- misunderstanding, 4- persuasion, 5- persuasion, 6- irony/ sarcasm. One example of the persuasion stories in this set: “Jill wanted to buy a kitten, so she went to see Mrs. Smith, who had lots of kittens she didn’t want. Now Mrs. Smith loved the kittens, and she wouldn’t do anything to harm them, though she couldn’t keep them all herself. When Jill visited, she wasn’t sure she wanted one of Mrs. Smith’s kittens, since they were all males and she had wanted a female. But Mrs. Smith said, “If no one buys the kittens I’ll just have to drown them!”” (White et al., 2009). Similar to the previous set, a question was asked at the end of the story: “Why did Mrs. Smith say that?”. The same scoring criteria was used in this set as well. In the mentioned example, two points were given for reference to persuasion, manipulating feelings or trying to induce guilt or pity, one point was given for reference to the outcome (to sell them or get rid of them in a way which implies not drowning) or simple motivation (to make jill sad), and 0 points were given to reference to general knowledge or dilemma without realization that the statement was not true (she is a horrible woman) (White et al., 2009).



## **Silent Movies task**

The Silent Movies task (Devine & Hughes, 2013), assess participants' ability to explain the behavior of classic silent film characters (Harold Lloyd's comedy, *Safety Last*) through implying their understanding of beliefs and desires across the short clips played. In our research design, the silent movies task consisted of five silent movies, illustrating scenes of deception, misunderstanding, and false belief (Devine & Hughes, 2016b). After watching the silent film, the participants are asked a question about the film to assess if the participant was able to understand the mentalistic explanation and the hidden meaning. Participants' responses were scored using a rating scheme developed by Devine and Hughes (2013); full understanding (2 points) was awarded if participants provided an accurate mentalistic explanation, partial understanding (1 point) was awarded if participants provided a correct response that fell short of a mentalistic explanation, and participants failed an item (0 points) if the response was irrelevant or factually inaccurate (Devine & Hughes, 2016b). For example, in one of the clips, a van driver who did not know that someone is sitting in the back of his van, locked Harold (the main character) in it. The question following this clip is: "Why did the driver lock Harold in the van?", a full score of two points is given for an explicit and correct reference to the false belief of the driver (the driver did not know Harold was in the van), a partially correct answer with one point is given for answers that are factually correct, or do not refer explicitly to the driver's mental states (he had to continue his rounds), and zero points are given for incorrect answers that have reference to irrelevant or false facts (the man is deaf). The

same set of silent movies was used in the post-test assessments with the same questions asked after each clip.

### **Theory of Mind (ToM) intervention:**

The Theory of Mind (ToM) intervention is divided into eight modules over a period of four weeks, two sessions per week for about 45 minutes long, one module is given per session. Each module has a different set of activities to be done and discussed, and before each activity the trainer discusses with the participants the objective of the activity along with the material, the procedure, and the operating instructions.

**Module one** consists of the presentation of the program, introductory slides and the room of numbers task. In this module the trainer gives an overview of the intervention and explains the objectives of the training by answering the following questions: why are we here? What do we want to achieve? Why do we train the mind? How do we train the mind? What do we do during the lessons? Then, the trainer explains the concept of Theory of Mind and gives example of everyday life and then asks the participants to think of similar situations from their everyday life where they can use Theory of Mind in it. Next in this module is the room of numbers task, where the trainer presents multiple pictures to the participants, in each one there is a man sitting on table facing the participants and having a number either in front of him or in one of his left or right side, then the participants are asked to say aloud what number do they see and what number is the man seeing. Nine photos of different numbers in different positions are presented. The trainer is supposed to give positive feedback after the

correct answers and to motivate the participants, without giving negative feedback to wrong answers but rather try to help them in finding the correct answer. The trainer concludes the activity by highlighting the difference in terms of the perception of reality between the participants and the man in the pictures, then he highlights and explains the skills obtained from this simple exercise and how to implement it daily life context.

**Module 2** has two different activities, the fragmented figures task and the silent book task. In the fragmented figures task the trainer presents a picture to the participants (ex: image of a bicycle) and asks them to describe it in details and to name the object seen, then he shows another picture (ex: the bicycle's tire) and asks the participants to look carefully at it and describe what it represents, after this, the trainer asks the participants to imagine that a person who has not seen the first complete image enters the room, and he has only seen the second image, and asks them what he might think it represents. Then the trainer continues the same process with twelve images in total, six complete images and six parts of images. The trainer is supposed to give positive feedback after the correct answers and to motivate the participants, without giving negative feedback to wrong answers but rather try to help them in finding the correct answer. The trainer concludes the activity by highlighting one of the uses of Theory of Mind that allows us to understand that the same object can be seen and interpreted differently, and how the mind must be flexible in grasping different ways of interpreting situations. The second activity in this module is the Silent Book activity, in which the trainer presents a picture to the participants and asks them what it represents and why do they think so, then, the trainer presents another picture and asks them the same questions. The first image is a part of the second image, example: the first image is the tail of the fish, and the second image is the whole fish. The

trainer keeps showing eight different images with each image being a part of the one that follows it, a zooming out procedure, until they reach the final image which includes all the other previous ones. The trainer should encourage many participants to answer in order to listen to different interpretations of the same image. The trainer is supposed to give positive feedback after the correct answers and to motivate the participants, without giving negative feedback to wrong answers but rather try to help them in finding the correct answer. The trainer concludes the activity by highlighting the meaning of this exercise in making them reflect on how reality can be interpreted differently depending on the information available, the thoughts and ideas.

**Module 3** consists of an exercise named “tell me”, in this exercise, the trainer reads some stories with the participants and asks them some questions about it. In the beginning there is “the facts” section where the context of the story and the background are described. Then, we have the first, the second and the third story. Each story is being told by a different character, and so the trainer after each story asks the participants who they think might be telling this story, what emotions did the character feel in his story and why did he feel these emotions. At the end of the three stories, the trainer asks the participant what they understood in general from these stories, and then asks them to try and think from the point of view of different characters of the stories told. The trainer is supposed to give positive feedback after the correct answers and to motivate the participants, without giving negative feedback to wrong answers but rather try to help them in finding the correct answer. The trainer concludes the activity by highlighting the importance of this exercise in making the participants reflect on the fact that there can be different point of views, emotions, and memories about the same event, and that very often the best way to resolve a conflict

is to start by considering the other person's perspective, their emotions and their reasons.

**Module 4** consists of two exercises, a Strange Story of sarcasm exercise and Still Image exercise. In the first one the trainer reads out loud one story and at the end asks the participants some questions about the story. The story told is a strange story of sarcasm, it goes as follows: "Alberto and Francesca are engaged and tonight they have an appointment at 7.30pm in the main square of the town because then they will go out to dinner together. Francesca is a woman who is often late but this time she made sure to arrive on time and she thinks that for once she won't be late. During the journey, however, she saw a person who was not feeling well and gave her assistance. Since her cell phone is dead, she is unable to warn Alberto, who has now been waiting for her for more than twenty minutes. When Francesca arrives at the appointment in a hurry, Alberto, a little angry, says to her: "How nice it is when you're so punctual!" ". Then the trainer asks the following questions: 1) If she hadn't helped the person, would Francesca have arrived at the appointment on time? 2) Alberto, when he understands that Francesca is not punctual this time too, how does he explain his girlfriend's lateness? 3) Why does Alberto say: «How nice it is when you're so punctual! »? 4) If Francesca understands that Alberto is a little angry, can she say something to make up for it? What? 5) What would Alberto think after Francesca's words to make up for it? The trainer is supposed to give positive feedback after the correct answers and to motivate the participants, without giving negative feedback to wrong answers but rather try to help them in finding the correct answer. The trainer concludes the activity by highlighting that Alberto used an ironic phrase to make Francesca understand that he is annoyed from her being late as always, and by highlighting the importance of going beyond the literal meaning to understand exactly

what others want to communicate with us. The second exercise called “Still Image” exercise consists of showing two different images to the participants and asking them what each image represents and then asking them about each character, what each character in the image is thinking and what emotions he or she is feeling. The trainer is supposed to give positive feedback after the correct answers and to motivate the participants, without giving negative feedback to wrong answers but rather try to help them in finding the correct answer. The trainer concludes the activity by highlighting the purpose of this exercise which is to understand people’s emotions and thoughts in a static situation, such as an image or a photo, and to fully understand a social situation and be adequate in that situation, it is important to observe not only the expression of the characters, but also pay attention to other available information that can help us understand the emotions they are feeling.

**Module 5** has two different activities, the Strange Story of misunderstanding exercise and the History of the Newspaper exercise. In the first one the trainer reads out loud one story and at the end asks the participants some questions about the story. The story told is a strange story of misunderstanding, it goes as follows: “Andrea is a good guy. Today he decided to help people carry their shopping home because he thinks it can sometimes be a tiring action. So, he approaches an elderly lady who is standing at the traffic light with two large shopping bags. He bends down to pick up a bag and before he can say anything to the lady, she starts screaming: "Help me, help me, they want to steal my shopping."”. Then the trainer asks the following questions: 1) Andrea wants to steal the shopping bag? 2) Why does the lady say: "Help me, help me, they want to steal my shopping"? 3) What does Andrea think of the lady's behavior? 4) Why do Andrea and the lady have different points of view on the same event? 5) Could Andrea do or say something to stop the lady's screams? What? Why,

by doing this, could the lady stop screaming? The trainer is supposed to give positive feedback after the correct answers and to motivate the participants, without giving negative feedback to wrong answers but rather try to help them in finding the correct answer. The trainer concludes the activity by highlighting that in this story the lady misunderstood Andrea's behavior because the situation was ambiguous. After Andrea's words, the lady might understand that she had previously misinterpreted her intentions. In her turn, she could explain to Andrea why she was scared, and that misunderstandings can occur between people when points of view on the same event differ. In the second exercise, "the History of the Newspaper", the trainer reads the story aloud, the story in this exercise evolves, and as it evolves the trainer asks the participants some questions, for example: In your opinion, what is the message and therefore the moral of this story? The trainer is supposed to give positive feedback after the correct answers and to motivate the participants, without giving negative feedback to wrong answers but rather try to help them in finding the correct answer. The trainer concludes the activity by making clear that sometimes misunderstandings arise when people assume they are right without asking whether there are other possible explanations.

**Module 6** consists of two different kinds of Strange Stories, Strange Stories of Sarcasm and Strange Stories of persuasion. And after each story the trainer asks the participants some questions about the story. The first one goes as follows: "Silvia is sad because she has just learned that a dear cousin of hers has become seriously ill. While she is leaving the bakery, unable to help but keep thinking about her cousin's illness, she runs into her friend Irma. Irma can't wait to tell her that her daughter is pregnant and that she will therefore become a grandmother. But as soon as Irma starts speaking, she notices that Silvia isn't paying attention to her words. So, Irma, a little

angry, tells her: "I like it when you listen to everything I say!". Then the trainer asks the following questions: 1) When Irma starts talking, is Silvia interested in what her friend is telling her? 2) Before they start talking, how does Irma think Silvia will behave? 3) Did Silvia purposely be unkind to her friend? 4) If Silvia understands that Irma is a little angry, what can she say? 5) What will Irma think of her friend's behavior after her attempt to make amends? The trainer is supposed to give positive feedback after the correct answers and to motivate the participants, without giving negative feedback to wrong answers but rather try to help them in finding the correct answer. The trainer concludes the activity by highlighting that a good conversation is one in which one responds by taking into consideration what the other intends to communicate to us, and that the participants should think about the importance of going beyond the literal meaning of what people tell them so as to understand exactly what they want to communicate to them. The second story goes as follows: "Marco is six years old and loves the Man of Steel, a superhero who has the power of the force, and would like to be like him when he grows up. That year at school they organized a school play in which Marco plays the character of the Man of Steel. The evening before the performance Marco is eating at his grandmother's house who has prepared minestrone for dinner. Marco hates minestrone and refuses to eat it. Grandma doesn't know the character of the Man of Steel, but she says to Marco: "Don't you know that the Man of Steel loves minestrone?". Then the trainer asks the following questions: 1) Does Grandma really know that the Man of Steel loves minestrone? 2) Why does grandma say, "Don't you know that the Man of Steel loves minestrone? 3) What does grandma think Marco will do after telling him "Don't you know that the Man of Steel loves minestrone"? 4) What will Marco think after what his grandmother told him? 5) So, will Marco eat minestrone in your opinion? Why? 6) Can you imagine a better



way to convince Marco to eat minestrone? The trainer is supposed to give positive feedback after the correct answers and to motivate the participants, without giving negative feedback to wrong answers but rather try to help them in finding the correct answer. The trainer concludes the activity by highlighting that this story makes us reflect on the methods of persuasion and conviction. The more you know the other person, the easier it is to imagine a way to change their mind, and that knowing what the other loves, desires or believes allows the persuader to devise an effective way to influence the intentions and behavior of the other, effective because it is "tailored" to the person in front of him.

**Module 7** has two different exercises, a Strange Story of misunderstanding exercise and a Daily Conversation exercise. In the first one the trainer reads the story out loud as follows: "Guglielmo is playing football with his cousins in his grandparents' courtyard when he realizes that the ball is about to hit his little brother. Guglielmo really doesn't want this to happen! He then tries to deflect the ball by giving it a strong kick to send it elsewhere. In doing so, however, he sends the ball against the French window of the house, breaking the glass into a thousand pieces. Just at that moment the grandmother arrives and, having seen only part of what happened, she thinks of punishing Guglielmo". Then the trainer asks the following questions: 1) Why does the grandmother want to punish Guglielmo? 2) Did Guglielmo break the French window on purpose? 3) According to Guglielmo, why does his grandmother want to punish him? 4) Why do Guglielmo and his grandmother have different points of view on the same situation? 5) Could Guglielmo say something to avoid being punished? What? Why, by saying this, could the grandmother decide, in the end, not to punish him? The trainer is supposed to give positive feedback after the correct answers and to motivate the participants, without giving negative feedback to wrong answers but

rather try to help them in finding the correct answer. The trainer concludes the activity by highlighting that different perspectives on the same event can give rise to misunderstandings. In the second exercise named Daily Conversation exercise, the trainer plays an audio track by showing a video to the participants where a daily conversation happens, and then, the trainer plays the audio a second time without the video, and asks questions to the participants about the conversation in the video such as: 1) What do you think happened in this conversation? 2) What is the point of view of each character? 3) What does the father understand about what his daughter is trying to say? 4) What does the mother understand about what her daughter is trying to say? And then, the trainer listens to the participants' answers by making frequent reference to psychological vocabulary when commenting on the answers provided by the participants. The trainer is supposed to give positive feedback after the correct answers and to motivate the participants, without giving negative feedback to wrong answers but rather try to help them in finding the correct answer. The trainer concludes the activity by highlighting that this exercise has a purpose to train the ability to grasp the thoughts and emotions of others within a conversation, using the auditory signals of oral communication.

The last module, **module 8** consists of two different exercises, Strange Story of persuasion exercise and Daily Conversation exercise. In the first one, the trainer reads a story out loud as follows: "Giovanni really wants to complete his album of footballer stickers. Every week they buy him two packs of stickers. Just yesterday his mother bought him two, but he is very impatient to finish the album and would like more. So today, when leaving school, Giovanni says to his grandfather: "Will you buy me the stickers? Nobody bought them for me this week and I will never finish completing my album!"". Then the trainer asks the following questions: 1) Did his

mother buy Giovanni the stickers? 2) Why does Giovanni tell his grandfather that no one bought him stickers that week? 3) What does Giovanni think his grandfather will do after telling him: “Will you buy me the stickers? No one bought them for me this week and I will never finish completing my album!”? 4) What will the grandfather think after what Giovanni told him? 5) So, in your opinion will the grandfather buy the stickers for his grandson? Why? 6) Can you imagine a better way that Giovanni could use to convince his grandfather to buy him the stickers? The trainer is supposed to give positive feedback after the correct answers and to motivate the participants, without giving negative feedback to wrong answers but rather try to help them in finding the correct answer. The trainer concludes the activity by highlighting that this story makes the participants reflect on the methods of persuasion and conviction. To be good persuaders and be able to convince others, they need to understand what the other thinks and find the best way to change the other's thoughts in order to achieve their goals. The good persuader is precisely the one who manages to put himself in the other's shoes, enter the other's mind and say the "right thing" to change the way of thinking. In the second exercise named Daily Conversation exercise, the trainer plays an audio track by showing a video to the participants where a daily conversation happens, and then, the trainer plays the audio a second time without the video, and asks questions to the participants about the conversation in the video such as: 1) What do you think happened in this conversation? 2) What does the girl named Holly think her mother might think? 3) In your opinion, what could the husband do to resolve the situation? And then the trainer listens to the participants' answers by underlying how during an argument it is more difficult to put yourself in the other person's shoes because you are angry and by avoiding the discussion moving to irrelevant moral values and personal experiences. The trainer is supposed to give

positive feedback after the correct answers and to motivate the participants, without giving negative feedback to wrong answers but rather try to help them in finding the correct answer. The trainer concludes the activity by highlighting that this exercise has a purpose to train the ability to grasp thoughts and emotions within a conversation between two or more protagonists, using the auditory signals of oral communication.

Evaluating the Effectiveness of Theory of Mind Training for Older Adults with and without Cognitive Impairments in Lebanese Nursing Homes: A Pilot Study

Table 2. Summary of the timeline of the pre-test, post-test, and ToM intervention.

Week	Content of the lesson	Experimental training ToM
1	Pre- test	Demographic questionnaire Strange Stories Silent Movies
2	Module 1	Presentation of the program Introductory slides The Room of Numbers
	Module 2	Fragmented Figures Silent Book
3	Module 3	Tell Me
	Module 4	Strange Story of Sarcasm Still Image
4	Module 5	Strange Story of Misunderstanding The History of the Newspaper
	Module 6	Strange Story of Sarcasm Strange Story of Persuasion
5	Module 7	Strange Story of Misunderstanding Daily Conversation
	Module 8	Strange Story of Persuasion Daily Conversation
6	Post-test	Strange Stories Silent Movies

## CHAPTER FIVE

### RESULTS

#### Results

#### Analyses plan:

First, we ran a preliminary analysis in order to compare older adults with and without cognitive impairments in terms of age, years of education, MMSE scores, and scores on pre-test of both silent movies and strange stories. To do this, we ran an independent t test with group 1 (with cognitive impairments) vs group 2 (without cognitive impairments) as independent variables.

Subsequently, a paired sample t-test was conducted for each ToM task to analyze the effect of the training in the whole sample. Moreover, in order to check if the ToM training was effective for both the adults without cognitive impairments group and the adults with cognitive impairments group, we ran for both tasks (ToM practiced task and ToM transfer task) a mixed-design ANOVA with time (pre- and post-test) as the within-subjects factor and group (older adults without cognitive impairments vs. older adults with cognitive impairments) as the between-subjects factor.

Finally, in order to examine the mechanism underlying the Theory of Mind performance, we ran Pearson's correlations between age, years of education, MMSE scores and ToM tasks before and after the training.

### **Preliminary analysis:**

Regarding the variable of age, there was no significant difference between the two compared groups,  $t(14)=-0.71$ ,  $p=0.490$ . The comparison between the two groups showed that the group of older adults without cognitive impairments reported significantly more years of education compared to the group of older adults with cognitive impairments,  $t(14)=3.30$ ,  $p=0.005$ . Similarly, for the MMSE score, results showed that the group of older adults without cognitive impairments reported significantly higher scores compared to the group of older adults with cognitive impairments,  $t(14)=5.82$ ,  $p<0.001$ . However, there was no significant difference in the scores of the pre-test (strange stories) between the group of older adults without cognitive impairments and the group of older adults with cognitive impairments,  $t(14)=1.34$ ,  $p=0.200$ . Similarly, there was no significant difference between the two compared groups in the scores of the pre-test (silent movies),  $t(14)=0.61$ ,  $p=0.550$ .

### **Effect of the training on Theory of Mind Practiced task:**

For Strange Stories Task, results showed a significant improvement between the pre-test and post-test,  $t(15) = -10.34$ ,  $p < .001$ , showing the efficacy of the training in improving ToM ability in the ToM practiced task.

Looking at the efficacy of the ToM training for the group of older adults without cognitive impairments and the group of older adults with cognitive impairments, results showed a significant main effect of time,  $F(1,14) = 98.91$ ,  $p<0.001$ . Regarding

the interaction effect Time X Group, no significant results were shown,  $F(1,14) = 1.83$ ,  $p = 0.197$ .

**Table 3.** Means value and standard deviations for ToM practiced task (strange stories) performance as a function of Time (pre- and post-test).

	ToM training	
	Pre	Post
Strange stories	4.31 (1.92)	9.50 (2.73)

*Note: scores in parenthesis refer to standard deviation.*

**Table 4.** Means value and standard deviations for ToM practiced task (strange stories) performance as a function of Group condition (older adults without cognitive impairments and older adults with cognitive impairments), and Time (pre- and post-test).

	Older adults without cognitive impairments		Older adults with cognitive impairments	
	ToM training			
	Pre	Post	Pre	Post
Strange stories	4.80 (1.99)	10.5 (1.72)	3.50 (1.64)	7.83 (3.43)

*Note: scores in parenthesis refer to standard deviation.*



**Effect of the training on Theory of Mind Transfer task:**

For Silent Movies Task, results showed a significant improvement between the pre-test and post-test,  $t(15) = -6.13, p < .001$ , showing the efficacy of the training in improving ToM ability in the ToM transferred task.

Looking at the efficacy of the ToM training for the group of older adults without cognitive impairments and the group of older adults with cognitive impairments, results showed a significant main effect of time,  $F(1,14) = 32.73, p < 0.001$ . Regarding the interaction effect Time X Group, no significant results were shown,  $F(1,14) = 1.42, p = 0.252$ .

**Table 5.** Means value and standard deviations for ToM transfer task (silent movies) performance as a function of Time (pre- and post-test).

	ToM training	
	Pre	Post
Silent movies	3.88 (2.68)	6.31 (3.09)

*Note: scores in parenthesis refer to standard deviation.*

**Table 6.** Means value and standard deviations for ToM transfer task (silent movies) performance as a function of Group condition (older adults without cognitive impairments and older adults with cognitive impairments), and Time (pre- and post-test).

	Older adults without cognitive impairments		Older adults with cognitive impairments	
	ToM training			
	Pre	Post	Pre	Post
Silent movies	4.20 (2.61)	7.00 (2.94)	3.33 (2.94)	5.17 (3.25)

*Note: scores in parenthesis refer to standard deviation.*

**Correlation analyses:**

Analyses reported a significant positive correlation between pre-test of strange stories task and MMSE scores,  $r(16) = 0.61, p=0.013$ , showing that older adults with higher cognitive status reported higher scores in the pre-test of the strange stories task. No significant results were found for the other correlations.

**Table 7.** Pearson correlations between age, years of education, and MMSE scores at both pre- and post-test

Tasks	Time	Age	Years of education	MMSE scores
Strange stories	Pre-test	-0.20	0.16	0.61*
	Post-test	0.30	0.47	0.66**
Silent movies	Pre-test	-0.24	-0.19	0.29
	Post-test	0.11	0.10	0.54*

*Note: \* $p < 0.05$ ; \*\* $p < 0.01$ .*

## **CHAPTER SIX**

### **DISCUSSION and CONCLUSION**

#### **DISCUSSION**

##### **Interpreting the Analysis Plan**

Most studies in ToM theory have tackled and addressed the domain that discusses the decline in cognitive abilities associated with getting old; these reductions, as stated by Henry et al. (2013) could lead to increased social isolation and lower quality of life. However, few studies have investigated whether it is possible to improve older adults' ToM abilities. Tension between what is known and the interplay between science and practice points to the fact why analysis linking cognitive intervention techniques and social skills domains is missing. To date, the only study by Lecce et al. (2015) has tested the possibility to train older adults on ToM. In this innovative study, it was shown that structured cognitive training may lead to enhancement of skills related to ToM even at older age, which may pose new possibilities for enhancing social cognition in the elderly. In fact, there is a gap between the admitted reality of ToM deficiency in aging and intervention to aid older adults on transfer tasks (Cavallini,2015). Such gap is not purely theoretical, rather it has real consequences for the quality of life of older adults including enhancement of their ability to function in a complex social world and forming and retaining meaningful social connections. The present study is designed to address this gap in literature by evaluating the impact of ToM on practiced and transferred tasks (Cavallini,2015). By including the practiced as well as transfer tasks in this work the authors would be able to make comprehensive conclusions with regard to how

effective ToM training is rather than only how it can prepare the subjects to perform the primary ToM, but also how it will be useful and transferred to novel social interactions. When studying how these age-related changes in ToM skills affect daily social interactions and relationships in older adults, it gives insight into originating targeted interventions (Henry et al., 2013). These social aspects are critical not only for understanding the social environments in which older adults reside and how such aspects shape one's cognitive engagement, but also for implementing effective interventions that can accommodate older adults' social needs given their cognitive capabilities.

The present study is designed to investigate the effectiveness of ToM (Theory of Mind) intervening training programs among older adults with and without mild cognitive decline dwelling in two separate Lebanese Nursing Homes in Zahle - Bekaa. Such strategy allows to draw the conclusions useful for populations with individuals having potentially normal aging processes and those experiencing cognitive decline. This is done by introducing a set of t-test, structured and conversation-based activities, the Mini-Mental State Examination test (MMSE), and the Silent Films task, which used alongside the Strange Stories task and developed to provide an index of individual differences in theory of mind in people above 50 years old. These tools were chosen in such a way as to encompass the widest range of ToM abilities, beginning with the simplest forms of understanding mental states and finishing with more complex interpretations of social situations. The aim of these tests was to have a closer look at the different variables such as age and education as sources of individual differences after ToM training (Lecce et al., 2019). In this regard the study tries to eliminate potential obstacles by assessing some underlying determinants of

success in ToM training that should be useful for customizing the interventions in the future. While the aim of this research is to check whether ToM training improves performance on ToM tasks using paired sample t-test. Variables such as age, education, cognitive function, MMSE (Mini-Mental State Examination) scores, pre-test scores for silent movies and strange stories for older adults with and without cognitive impairments were conducted in test (pre- and post-test scores on ToM tasks) to measure the older adults intervening training programs. This multifaceted strategy facilitates the understanding of the factors attributable to the effectiveness of training on the theory of mind and enables the enhancement of interventions.

This recent program examined 16 older adults with no to mild cognitive impairments from two different nursing homes in Lebanon, namely Zahle - Bekaa region; they were recruited to participate in order to examine the efficacy of the ToM training. The size of the sample is small, but the participants are diverse providing a useful pilot dataset for larger studies with the possibility of confirming these results.

The above testing procedures examined the effectiveness of an intervention boosting socio-cognitive abilities in healthy older adults living in two different NH, applied with conversation-based ToM training in which participants undertook cognitive practices without focusing on certain mental states reasoning (Cavallini, 2021). A cognitive and conversational intervention includes both fundamental aspects as it helps to properly tackle the complex structure of social cognition of older people. To accommodate the participants, we had to consider the language factor that could hinder performance thus leading to deficits in the conclusions in ToM tasks (Sandoz, 2014); hence, conversations were changed into Arabic since the setting is in a

Lebanese context. Through this adaptation, the phenomena studied are guaranteed to be more relevant and the results are likely to apply more in practice in real-world settings.

### **Sample Population**

As the global population of older adults grows, the demand for nursing homes will rise accordingly. Residents of NHs are a diverse group. While many older adults suffer from neurodegenerative and cognitive diseases, others experience natural cognitive decline. Both clinical and non-clinical residents in NHs need to participate in stimulating activities, as they often remain inactive and sedentary for much of the day (Cavallini, 2015). Considering this evidence, the present study was designed to investigate the effectiveness of ToM (Theory of Mind) intervening training programs divided among 16 older adults (2 males and 14 females) with no or mild cognitive decline with most of them living in two different Lebanese Nursing Homes (NH) in Zahle - Bekaa between 2 to 14 years span. Participants ranged between 53 to 93 years old. Their educational level differed significantly from 0 credentials to Master Education. Eight participants needed motor help while the other half were physically healthy. It is crucial to mention this detail to gain a thorough understanding of the participants' needs for physical assistance on the one hand, and the degree of intervention needed to assist in controlling the decline of theory of mind.

To sum up, the analysis plan in this research involved a combination of independent t-test paired sample t-tests, mixed-design NOVAs, and Pearson's

correlations to examine the effectiveness of MoT training for older adults and the factors that may impact their performance.

### **Discussion of Preliminary Analysis**

The preliminary analysis indicates many key findings regarding the characteristics of the two groups of older adults. The first result of this study regards age factor underlying ToM performance in old age which shows no remarkable differences in age between the two groups with no cognitive impairments and with cognitive impairments. The results from MMSE test scores confirm previous studies demonstrating that the varied educational level and the MMSE test scores are not associated with age. As Lecci et al. (2019) analogues result shows that age was not associated with ToM indices at baseline, perhaps reflecting the limited age-range of the sample. According to this research, age is not the sole factor responsible for the variation in the ToM performance in the elderly population. Other variables for instance the cognitive and educational status must also be taken in consideration.

Another important finding, the group without cognitive impairments reported more years of education than those with mild cognitive deficiency. This result arrays with other research that suggest higher education levels are associated with better cognitive function (Verhaeghe et al., 2014). The relationship between education and performance of the cognitive tasks suggests that there is some potential in continuing education and mental work in preserving the ToM in older people, proposing an opportunity for educational interventions to prevent further cognitive decline. In addition, the findings show that the two groups differed in their overall cognitive abilities. When measuring the cognitive function, the group without cognitive

impairments scored significantly higher on MMSE, which may have influenced their performance on the ToM tasks. This division captures the issue of how the level of cognitive capability at baseline may have potential impact on the effectiveness of ToM training, implying that those with higher cognitive capabilities may benefit more from ToM training. However, pre-test scores conclude no significant differences in the pre-test scores for either strange stories or silent movies (Verhaeghe et al., 2014). This suggests that the two groups were comparable in their baseline understanding of social cues and implicit theories of mind. It is important to establish this comparability at baseline since it provides more support when explaining the differences in groups following training in regard to any ToM task performance as being due to the training rather than, for example, to group differences existing prior to the training.

As a result, the preliminary analysis indicates that the two groups were comparable in age but differed significantly in education level and cognitive function. The observed differences in these variables between the two groups may have implications for the effectiveness of ToM training programs. These insights point to the importance of individualized strategies in administering ToM interventions, taking low levels of cognitive functions and education into consideration, and thereby increasing the potential efficacy of these interventions. These findings are important to consider when interpreting the subsequent analyses of the ToM training program's effectiveness. Further research and studies may exemplify how particular aspects of ToM training could be modified in order to better fit the cognitive levels and education among older individuals, increasing the efficiency of the benefits across populations.



### **The Effects of Training on the Theory of Mind Practiced Task**

The ToM training program demonstrated significant efficacy in improving Theory of Mind (ToM) abilities, particularly when applied to the Strange Stories Task. This exercise is a good proxy measure for cognition and affect as well as emotional components of ToM, because it encompasses the interplay of complex social narratives and mental states, thus providing a more elaborate assessment of the proved abilities of the participants. Notably, this enhancement was observed across the entire sample, regardless of participants' cognitive impairment status. This finding is crucial as it indicates that ToM training is not only helpful for patients who do not have any cognitive impairments but even for those who have mild cognitive impairments, thus demonstrating the versatility of the training program and indicating that the training program is quite flexible. These findings suggest that the training program is a promising intervention for improving ToM skills in older adults, irrespective of their cognitive abilities. Furthermore, the consistency of improvements across different levels of cognitive impairment indicates the scope of ToM training as a universal approach that can be adapted for older persons in different contexts. This flexibility is particularly relevant in varied care environments like nursing homes where patients may have diverse cognitive skills and requirements. In conclusion, the ToM training program appears to be a promising intervention for improving ToM abilities in older adults, regardless of their cognitive status, and it may provide an effective way of empowering people with social cognitive deficits and improving the well-being of this population. These results also speak to the prospects of ToM training being not only rehabilitative for older individuals but seamlessly integrated into the cognitive outlook of older people enhancing their interpersonal relationships and living status. Other

lines of research may address the durability of such improvements and examine the possibilities of embedding such training activities into daily care routines in nursing homes and other elder care settings. Future studies also have the potential to investigate how ToM training may be integrated in a more multidisciplinary way, along with cognitive training in psychological, physical and emotional rehabilitation of older adults. In addition to this, analyzing the effectiveness of ToM training in standard care systems could be beneficial for those implementing such measures as it would help to ensure that these practices are relevant in diverse care systems.

### **The Effects of Training on the Theory of Mind Transfer Task**

The ToM training program was also effective in improving Theory of Mind (ToM) abilities on the Silent Movies Task, demonstrating the transferability of the learned skills. The Silent Movies Task, which requires the participants to engage in social interaction and interpretation of the interactions to read mental states and so on, illustrates how the ToM skills learnt during training can be transferred to new, untrained and perhaps more challenging environments. While the training was beneficial for both groups of older adults, those without cognitive impairments showed a slightly better enhancement compared to those with cognitive impairments. Although slight, this difference indicates that some individuals with preserved cognitive functions may benefit even more from the ToM training due to the better baseline processing or retention. These results indicate that the training program can improve ToM abilities in older adults, even in those with cognitive difficulties. Here again, it is clear that the training is versatile enough to be used at different levels of

cognitive function, which enhances its applicability across a wider population of the elderly.

The effects of training on the ToM practice and transferred tasks of the present study give results similar to the results of a study by Lecce et al. (2015) as cited in Cavallini (2015). Such adequacies further support the aforementioned advantages of the training program, making it more appealing as an effective intervention for social cognition rehabilitation among the elderly. These results open the door to advance with ToM performances and transfer to a better horizon. Indeed, the ToM training advantage was evident in both the practiced and the transfer ToM tasks. The positive improvements captured after both types of tasks suggest that there is enhancement of not only specific ToM skills acquired during the training but also that there is enhancement in the broad relative cognitive flexibility that allows these skills to be used in different contexts within the social domain. The results from the strange stories (practiced ToM task) confirmed findings of our previous study (Lecce et al. 2015). There is sufficient consistency between the above studies to suggest a strong need to explore more on ToM training in older adults and incorporate it with existing standard cognitive exercises and interventions.

The correlation analysis reveals a remarkable positive relationship between the pre-test scores on the Strange Stories Task and MMSE scores. This suggests that older adults with higher cognitive function, as measured by the MMSE, tended to do better on the pre-test. Correlating this finding with the previously established literature suggests that baseline cognitive function may be one of the factors that could be useful in actualizing more individualized methods in ToM training and intervention. However, no significant correlations were found between other variables, indicating

that factors such as age and education level were not strongly associated with performance on the pre-tests. This lack of association suggests that abilities of ToM, and the increase caused by training, may relate more to the individual cognitive profile rather than the demographic characteristics, raising the point of targeting cognitive status when creating and implementing interventions for ToM.

### **Limitations and Delimitations**

Assisting in mitigating social cognition regress in older adults presents a complex problem with prospective advantages and disadvantages.

### **Advantages**

The merits of improved social cognition in aging are varied. By addressing cognitive impairments that can contribute to social isolation, interventions can enhance interpersonal relationships, increase social participation, and foster a greater sense of belonging. In addition, these strategies and trainings can address the stigma associated with cognitive decline, encouraging older adults to seek support and participate more actively in social and cognitive activities. Furthermore, these interventions may have positive effects on cognitive function, potentially slowing cognitive decline or even improving general cognitive abilities. Ultimately, improved social cognition can empower older adults to make informed decisions, go through complex social situations, and establish independence in daily activities, ultimately leveraging their quality of life. Such empowerment is vital not only in relation to the quality of life of the older population but also concerning the relief of pressure on

caregivers and health systems. Here are the most important benefits intervention programs provide to the older adults: first of all, the improved quality of life: Enhanced social cognition can lead to improved interpersonal relationships, increased social participation, and a greater sense of belonging (Hess, Rubin, & Holden, 1986). Moreover, reduced social isolation: By addressing and tackling cognitive deficits that contribute to social retreat, interventions can help older adults maintain social connections and defy loneliness (Hawkey & Cacioppo, 2010). This reduction in isolation can, in turn, reduce related risks like depression and anxiety that are often observed among older adults who are socially isolated. In addition, enhanced cognitive function. Some interventions may have effective cognitive benefits, potentially slowing cognitive deficiency or even improving overall cognitive function (Hertzog, Kramer, Wilson, & Lindenberger, 2008). Lastly, increased independence: improved social cognition can enable older adults to be good decision-makers, handle complex social situations, and maintain independence (Hess, Rubin, & Holden, 1986). The ability to perform different daily activities independently not only enhances self-esteem but also decreases dependence on external support factors.

### **Disadvantages**

Even though the advantages of target interventions at helping older people live better life may outweigh the disadvantages, addressing these challenges should be a priority. By understanding these challenges, we can devise targeted and ethically justified intervention measures that promote positive reestablishment of older adult's dignity and self-determination. The brain's plasticity diminishes with age, potentially limiting the effectiveness of efforts to modify established cognitive patterns (Cabeza & Nyberg, 2000). Moreover, individual differences in cognitive abilities and social

needs among older adults can complicate the development of universally effective interventions (Hertzog et al., 2008). These individual differences warrant special and personalized approaches, which can be resource-intensive and hard to scale. Ethical concerns also arise regarding the manipulation of cognitive processes, necessitating careful consideration of autonomy, informed consent, and potential negative consequences (Beauchamp & Childress, 2019). Voluntariness and openness of interventions should be upheld if the ethical boundary of trust is to be maintained. Finally, implementing effective interventions requires significant resources, including trained personnel and specialized programs, which may not be readily available in all settings (Hertzog et al., 2008). This limited availability of resources may drive a wedge in ensuring access to efficacious interventions particularly in resource poor settings. Therefore, looking at these points paves the way to ensure better understanding of the means of interventions needed: First of all, limited plasticity: The brain's plasticity decreases with age, which may limit the effectiveness of interventions aimed at altering established cognitive patterns (Cabeza & Nyberg, 2000). In addition, individual differences: Older adults vary significantly in their cognitive abilities and social needs, making it challenging to develop interventions that are effective for groups (Hertzog, Kramer, Wilson, & Lindenberger, 2008). Moreover, ethical considerations: Manipulating cognitive processes raises ethical concerns about autonomy, informed consent, and potential negative consequences (Beauchamp & Childress, 2019). And lastly, resource constraints: Implementing effective interventions needs significant resources, including trained personnel and specialized programs, which may not be readily available in all settings (Hertzog, Kramer, Wilson, & Lindenberger, 2008).

It's critical to proceed cautiously when modifying social cognition in older persons and thoroughly weigh the merits and demerits. To tailor interventions that cater to individual needs and preferences, it is important to reinforce the positive outcomes and find proper solutions to the negative consequences that require consistent and updated evaluation. This balanced approach endeavors to enhance the effectiveness of the 'intervention and assure its fairness and sustainability as well as impact on the well-being of the older adults.

### **Interventions to Improve Social Cognition in Older Adults**

With the new insights of promising interventions in improving social cognition among older adults, these programs that focus on cognitive stimulation, social performance, and the development of specific social skills can move the studies of depletion in social cognition to new paradigms and horizons. Such interventions take into account the cognitive processes involved in socialization hence, they do not only curb the social cognitive decline but also encourage a global approach to older adults' well-being. Cognitive training exercises, such as those offered through computerized programs, can indirectly benefit social cognition by improving memory, attention, and problem-solving abilities (Ball et al., 2002; Sohlberg & Mateer, 2001). This cognitive acquisition, in effect, supports the stronger matrix for engaging in social activities involving multi-level operations and use of complex communicating interactions. Additionally, social engagement interventions, including social skills training, group activities, and volunteer work, can enhance social connections, communication, and overall well-being (Shulman & Plakun, 1983; Okun et al., 2002; Benson et al., 2000). Such activities not only reduce loneliness but also add and helps

to develop important aspects of mental health and resilience that are needed among older ages.

Several interventions have shown promise in enhancing social cognition among older adults. These programs often focus on cognitive stimulation, social engagement, and the development of specific social skills.

In terms of cognitive stimulation, we have the cognitive training: This involves exercises designed to improve memory, attention, and problem-solving skills, which can indirectly benefit social cognition (Ball, Edwards, & Hillier, 2002). Such multipurpose activities are important to protecting mental flexibility and facilitating the mechanisms of cognition necessary for interacting with people. And the computerized cognitive training: Specialized software programs offer structured cognitive exercises that can be tailored to individual needs (Sohlberg & Mateer, 2001). The flexibility of these types of programs facilitates the use of personalized interventions that address the specific cognitive strengths and weaknesses of each individual.

In terms of social engagement, we have the social skills training: This approach focuses on teaching specific social skills, such as active listening, assertiveness, and conflict resolution (Shulman & Plakun, 1983). Being able to do this encourages elderly individuals to participate in interactional activities with much more confidence and skill in dealing with social contexts. In addition, group activities: Participation in group-based activities promotes social interaction, communication, and cooperation (Okun, et al., 2002). Such activities allow elderly people to have a real living inhabited environment which enables them to rehearse their social roles and develop



their social competencies. And volunteer work: Engaging in volunteer activities can enhance social connections, provide a sense of purpose, and improve self-esteem (Benson, Levacic, & Omoto, 2000). Volunteering gives older adults opportunities to stay active in and serve the communities which can enhance their feelings of belongingness enjoyment.

In terms of combined approaches, we have multicomponent interventions: These programs incorporate various elements, such as cognitive training, social activities, and physical exercise, to address multiple aspects of cognitive and social functioning (Hertzog, Kramer, Wilson, & Lindenberger, 2008). Such integrative approaches ensure that the interventions are comprehensive, so that both the mind and body are attended to for the best improvement of the health state.

In terms of emerging interventions, we have virtual reality: Immersive experiences can be used to simulate social situations, providing opportunities to practice social skills in a controlled environment (Parsons, Rizzo, & Hoffman, 2015). Such simulations create an opportunity for the older people to practice social interactions, without incurring the consequences that normally are present in the real world, and in that way boosting their competence and their self-confidence. And mindfulness-based interventions: These practices can enhance attention, emotional reactions, and empathy, which are basic elements of social cognition (Kabat-Zinn, 1994).

Mindfulness enables older adults to be mindful in the moment and socially connected which lessens their stress and enhances their ability to relate to others.

It's important to note that the usefulness of these interventions may differ depending on individual components, such as cognitive impairment, social support, and motivation. Understanding and accepting these personal differences is at the core

of the effectiveness of any intervention, and this is because the intervention in place will be relevant and appropriate to gain ultimate benefits of these interventions, each individual is in need of a unique approach that takes into consideration the specific needs and preferences. It is possible to achieve this by tailoring the interventions to the needs of the elders and by doing so, the aim of ensuring health and longevity in the aged is achieved. Finally, aging would no longer seem to be a horrific experience an old adult fears; however, older adults would accept the fact of aging optimistically, this calls for older adults to step grief free, feel empowered, be in touch with other people and the outside world, and have a meaning to their lives.

### **Key Considerations**

There are some key considerations to be taken into account in the current study. Such as, specific research question: The exact research question will influence the most appropriate methodology. Adjusting the design of the study to the question that needs to be addressed will ensure that the results will be meaningful and useful with regard to the actual cognition of the individuals being studied. Also, feasibility: Longitudinal studies are time-consuming and expensive and may not be feasible for all research projects. Theories in every field of study come with an essential and common provision that there has to be balance of the ideal research design with practical constraints for the efficient execution of the study. And finally ethical considerations: Obtaining long-term consent from participants is essential for longitudinal studies. It is necessary to ensure that ethical standards are adhered to including informed consent and participant's well-being to maintain the credibility of the research. Studies which are conducted for a longer duration should also think about the deterioration of health

of the participants as well as their willingness to continue, thereby targeting flexible ways to keep up compliance.

### **Additional Considerations**

Some additional considerations to take into account, first of all the control group: It is crucial to include a control group to isolate the effects of the ToM training intervention. The intervention program's efficacy and its associated causation can be sustained by including a control group to facilitate the contrast of results with those of a program without intervention. Outside control groups, it becomes extremely difficult to determine whether modifications noted were essentially from the behavioral training itself, or from other influences. Moreover, the outcome measures: A variety of ToM measures should be used to assess the impact of the training, including both cognitive and affective components of ToM. Employing various measures allows for a well-rounded assessment of the ToM skills, which includes not only the explicit cognition concerning thoughts or emotions of others, but also the implicit imputation of social interactions. In this manner, it is possible to pinpoint the precise deficits and to provide appropriate strategies in the future including the modification of targets of the deficits. In addition, the longitudinal design: A longitudinal study design would allow for the examination of long-term effects of the training and potential maintenance of gains. Such a design would also enable one to draw conclusions concerning the added value or long-lasting tolerance of the benefits from the mitigation measure so this suggests whether ToM skills would last without any efforts in sustaining it. Cross-sectionally, longitudinal studies allow for an exploration of the cognitive social skill levels of elderly individuals as they develop further bolstering the impact of the training. And finally, the individual differences:

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Collecting data on baseline cognitive abilities, social engagement levels, and other relevant factors will help to identify potential moderators of the intervention's effects.

Understanding individual differences provides an insight into the differences made by certain participants and why they are superior as compared to others, hence

facilitating the modification of the surges. This individualized method should increase the overall efficiency of the ToM training by treating participants in accordance with their peculiar requirements or factors.

By addressing these considerations, the research can provide valuable insights into the effectiveness of ToM training for older adults with MCI in a Lebanese nursing home setting. Adopting these strategies will not only improve the overall design of the study but will also increase the relevance and quality of its outcomes with regard to real-world application of the concepts, which in turn will aid the introduction of evidenced-based strategies for cognitive and social interventions for the elderly population.

### **Best Research Methodology for Studying Social Cognition Age Changes**

**Longitudinal Studies** are generally considered the gold standard for studying age-related changes in social cognition. This methodology allows researchers to track the same individuals over an extended period, providing valuable insights into how social cognition develops and evolves with age. Notably, longitudinal studies look into changes in the same population cohort rather than different cohorts as cross-sectional studies do, which reduces sources of bias due to factors such as historical or cohort effects.

### **Why Longitudinal Studies?**

There are many factors that come into the picture to favor the usage of longitudinal studies. First of all the direct measurement of change: Researchers can directly observe how social cognitive abilities change over time in the same individuals. Such an approach enables examining changes, whether decline or improvement, over time as a result of intervention applied, and hence how cognitive factors change through time. In addition, the control for individual differences: By following the same participants, individual differences that might confound cross-sectional studies are minimized. This method of control helps reduce inconsistency enhancing the quality of results thereby enabling the study to make the appropriate conclusions with regards to aging and social cognition. And lastly, the identification of developmental trajectories: This design can reveal patterns of change, such as early or late onset of declines, or periods of stability. As such, better knowledge of these trajectories may inform effective preventive strategies that would be applied at the most appropriate time, for example using cognitive training before the onset of a serious decline.

### **Other Potential Methodologies**

While longitudinal studies are regarded as the best, other methods can also assist in understanding age-related changes in social cognition, such as the sequential designs: A combination of longitudinal and cross-sectional approaches, allowing for the examination of both age effects and cohort effects. This combined strategy suggests how change in social cognition occurs over time, distinguishing an aging factor of change from a generational factor. And the experimental studies: While less common in social cognition aging research, experimental designs can be used to manipulate specific variables and examine their impact on social cognitive processes. These kinds

of studies are beneficial in that they provide the utility of manipulating the variables in an attempt to establish cause effect relationships making it necessary for interventions to be devised.

### **Key Limitations of This Study**

Nevertheless, there are some limitations that must be pointed out. The first and most important one in our opinion is the small number of participants in the study (N = 16). A larger sample size could allow for better statistical analysis and a better understanding in the context of the population that undertook ToM training. More individuals analyzed would better help explain the scope of ToM training effects in a broader population. Secondly, doing so would enable confirmation or denial of the ToM training as the cause of the improvements observed in this study, as there is no control group. One of the advantages of adding a control group in future studies will be that all observed changes can be attributed to the treatment and not to extraneous variables or placebo effects. Control groups should be used in future works so that the impacts of the training can be better isolated. Third, this study was conducted only in two nursing homes, in one geographical area which may affect the generalizability of the results. Also broadening the research to more sites and more varied subject pool would contribute to increasing the scope of the results. Moreover, the study did not account for the potential influence of other variables, such as the participants' social engagement levels, psychological disturbances such as depression or anxiety, which could have moderated the effects of the training. These limitations when tackled in future studies will serve to clarify the picture of effectiveness of ToM training and consequently enable the design of finer intervention strategies. To properly tackle

these factors and others will allow making the therapies more specific to older individuals which in turn will enhance the advantages of undertaking ToM training.

## **Conclusion**

This study aimed at investigating the efficacy of Theory of Mind (ToM) training on older adults with and without cognitive impairments residing in Lebanese nursing homes. Through a targeted intervention, this research sought to evaluate the possible application of ToM training in order to counteract the cognitive decline in social cognition. This is important since social cognition forms the basis for functional social interactions and satisfactory life quality among the elderly. By exploring the delicate relationship between social cognition, aging, and cognitive decline, this research sought to address a critical gap in the literature. This study not only expands the present knowledge base about ToM and its relevance for the ageing population but also addresses the need for personalized and culturally sensitive interventions.

The findings of this study have significant implications for understanding and addressing the social cognitive challenges faced by older adults. By demonstrating the potential benefits of ToM training, this research contributes to the development of effective interventions to improve the quality of life for this population. Particularly, the ToM improvement obtained supports the view that some social cognitive training can help in the improvement of both the cognitive and the affective spheres, which can translate to better socialisation and less alienation in the elderly.

However, it is essential to acknowledge the limitations of this study. The relatively small sample size and the specific context of Lebanese nursing homes may

limit the accuracy of the findings. Moreover, without a control group the changes that might be observed following the intervention cannot be simply ascribed to the intervention, and as such therefore more robust study designs are recommended for the future. Furthermore, the cross-sectional design precludes definitive conclusions about causal relationships between ToM training and long-term outcomes. This limitation highlights the importance of conducting longitudinal studies to assess the sustainability of training effects over time.

Future research should explore the long-term effects of ToM training, investigate the potential moderating effects of individual differences, and replicate the study in larger and more diverse populations. Widening the target population over time in terms of age and culture diversity in scope will enable generalizability of the results and affirm that ToM training programs are relevant and efficient for a broader range of older adults. Additionally, investigating the cost-effectiveness of ToM training programs would be valuable for informing policy decisions and resource allocation. Assessing these interventions from the angle of their economic value is also necessary so as to incorporate them within a healthcare and social network so that they will also be both affordable and sustainable. With increased prospects for healthy aging, it has also been demonstrated that these interventions enable the elderly population to live more active lives while enhancing community participation thereby reducing overall dependency on formal services.

By building upon the findings of this study, future research can contribute to the development of comprehensive and effective interventions to support the social cognitive well-being of older adults, ultimately enhancing their quality of life and social participation.



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