

# The relationship between creative, cognitive, and emotional competences in Intellectual Disability. A case report.

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## Abstract

*People with intellectual disabilities (ID) show cognitive deficits that are subject to an earlier deterioration and they experience difficulties in the social-emotional sphere. Various stimulation techniques exist to strengthen these skills that, however, are not usually proposed to individuals with ID because 1) the users are not necessarily in senile age, nor do they have an acquired impairment that requires rehabilitation. Consequently, it is erroneously assumed that their condition cannot be improved. 2) The standard pathways include socio-educational objectives, but not specifically neuro-cognitive ones. We believe that divergent thinking and creativity could be particularly suitable and proficient areas of intervention to promote a flexible, original, and autonomous thinking that can be extended in many different domains. To do so, we designed a research-intervention project named SoCraTEs (Social-emotional, Creative, and Thinking Enhancement), which is aimed at empowering these areas of interest, proposing creativity as an elective*

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*tool. In this paper we illustrate the results of a preliminary phase where we first explored the relationship between the aforementioned abilities to identify the most significant components that had the greatest potential. We found that creative abilities are strongly related to attentional, mnemonic, and emotional skills, together with personal autonomy in everyday life. Implications for future research are discussed.*

**Keywords:** Intellectual Disability; Creativity; Divergent Thinking; Assessment.

## 1. Introduction

Intellectual Disability and Developmental Disorders (ID/DD) represent heterogeneous conditions, which are characterized primarily by cognitive deficits and a severe difficulty in achieving a fully adaptive functioning in everyday life. The disability occurs during the period of development and results in an impairment of the mental development, with repercussions on cognitive, motor, and social skills. More specifically, a person with ID manifests difficulties especially in terms of executive functioning. Indeed, reasoning, problem-solving, planning, and abstract thinking are particularly involved, as well as judgment and school learning. The impairment in these areas results in a rigidity of thought and in substantial difficulties in adapting to new situations and in seeking solutions for abstract, as well as practical, problems (Vanutelli, 2020).

People with ID show limitations in meeting developmentally appropriate levels of independence and responsibility. For example, they require support for personal care, communication, independent living at home, at school and in the community. Other skills (such as managing the concept of time and numbers, the ability to follow rules/obey to laws, occupational skills, travel/transportation, safety, use of money, and use of technology) are also impaired. IDs are typically classified according to deficit severity as mild, moderate, severe, and profound (DSM V; American Psychiatric Association, 2013). Each level of severity comes with its own degree of intellectual, physical, and adaptive functioning, and requires a specific level of support or care.

Besides the specific cognitive limits due to neurological impairments, the person with ID often deals with emotional issues. Indeed, several studies have shown that people with ID may have difficulty in managing anger and stress. Previous research underlined that children and adolescents with ID have an increased risk to develop emotional disorders, ranging from three to seven times higher than peers with typical development (Einfeld, Ellis, & Emerson, 2011; Alimovic, 2013). Moreover, even if this pattern diminishes over time, it persists into adulthood (Einfeld *et al.*, 2011) and can deeply affect the person's well-being, reducing social integration, employment and increasing proxies distress (Einfeld & Tonge, 1996; Marsh & Ng, 2017). Furthermore, besides the regulation of emotions, people with ID show limitations in their social cognition and interpersonal skills, such as perceiving the mental states of others (Dianne, 2004; Kaland, Smith, & Mortensen, 2007). It has been suggested (Cheng & Chen, 2010) that these

dysfunctions could rely upon an impairment in the perception of emotions (Begeer, Koot, Rieffe, Terwogt, & Stegge, 2008; Cheung & Virji-Babul, 2008). For example, an extensive literature review (Scotland, Cossar, & McKenzie, 2015) revealed that adults with ID have a poorer performance in recognizing emotions from facial expressions when compared with either adults or children without ID. It appears clear that such difficulties can deeply affect the life of people with ID, especially in creating and maintaining meaningful social interactions (Carpendale & Lewis, 2006), thus suggesting the importance of effective interventions.

One last point we would like to consider is creativity. This skill is pretty much neglected in the field of intellectual disability since it sounds rather incompatible with rigidity of thinking, repetitive behavioral patterns, difficulty to adapt to new situations and, most of all, with the low intelligence quotient, often considered indispensable to give rise to creative products. However, previous research underlined that, although there are some points of overlap, creativity and intelligence are rather distinct psychological constructs (Jauk, Benedek, Dunst, & Neubauer, 2013; Benedek, Jauk, Sommer, Arendasy, & Neubauer, 2014; Lucchiarri & Vanutelli, 2020). Indeed creativity, and especially divergent thinking, is a competency that allows to produce original and valuable ideas (Barron, 1955); in the case of intelligence, on the other hand, it is a matter of reasoning effectively within a cognitive domain.

One of the earliest studies (Buffmire, 1969) revealed that children with ID scored higher than the control group on nonverbal tests of a creative battery. A later study conducted on 40 children with intellectual disabilities and 40 children with typical development (Blanc, Tourrette, Delétang, Roux, Barthélémy, & Adrien, 2000) investigated the relationship between symbolic play and creativity. The study design required pairs of children to perform different types of symbolic play. Results from observations allowed to highlight the absence of a difference between the two groups in terms of behaviors related to symbolic thinking, although the group of children with ID showed a greater difficulty in terms of self-regulation behaviors. However, despite the paucity of the literature, creativity might be considered a relevant aspect in this context not only as a measure of flexible thinking and cognitive skill, but also as a possible means to promote learning, exploiting the power of engaging, funny and inclusive activities.

Considering the impact of cognitive and emotional impairments in the life of people with ID, it is important to provide specific interventions across the lifespan of these individuals through habilitation pathways. These should

be customized on each individual's personal needs and can include special education, psychosocial treatments, vocational counseling, and, when possible, employment services. One of the main goals of such interventions is to promote social inclusion, in order to offer people with ID an adequate support to meet the opportunities of a social life.

In Italy, one of the most important services that are responsible of taking care of adults with ID are social cooperatives. Their aim is to promote users' psycho-physical well-being, to develop residual skills, and to sustain those already acquired by offering educational training and socializing activities, such as group-based cognitive activation, pet-therapy, job placement experiences, music, and handicraft laboratories, and so on. The activities are typically managed by professional educators and planned by considering both the individual's and the group's needs. In addition, a psychologist is generally available to supervise the teamwork and to manage the relationships with the families.

However, although these activities offer a vital and wide assistance covering several spheres of the well-being of people with ID, no specific neurocognitive support is proposed to empower those abilities that so deeply impact everyday functioning. Also, the ID population does not always meet the interest of neuropsychologists and researchers, since they do not display acquired cognitive impairment to be restored. Indeed, the presence of a low Intelligence Quotient (IQ) is accompanied by the idea that the mental competence is impaired and compromised, and cannot, thus, be empowered since it will never get closer to "normal". We believe that this tacit attitude should be challenged by providing people with ID with an adequate support to develop their full potential. Also, previous research underlined that the cognitive decline is especially challenging in this population, implying that a continuous monitoring and support should be provided to slow it down (Strydom, Shooshtari, Lee, Raykar, Torr, Tsiouris *et al.*, 2010).

The development of a strong, scientific-based approach to support the competences of people with ID should be promoted. With this in mind, we developed the idea of an action-research called SoCraTEs (Socio-emotional, Creative, and Thinking Enhancement), that is meant to support three main areas: the cognitive, the socio-emotional, and the creative spheres.

As regards the cognitive area, although the available literature is poor, some studies underlined the efficacy of a cognitive training in supporting executive functioning in children (Söderqvist, Nutley, Ottersen, Grill, & Klingberg, 2012) or adolescents with ID (Van der Molen, Van Luit, Van der Molen, Klugkist, & Jongmans, 2010). Interestingly, trends of improvement

in cognitive function were observed even in adults (Siberski, Shatil, Siberski, Eckroth-Bucher, French, Horton *et al.*, 2015).

Considering the socio-emotional area, instead, previous studies underlined that, following a specific training, people with ID were able to improve their emotional competences in terms of emotion recognition (Rydin-Orwin, Drake, & Bratt, 1999; Downs & Strand, 2008), emotion regulation (Safitri, Salim, & Widyasari, 2017; Safitri, 2020), emotional intelligence (Adibsereshki, Shaydaei, & Movallali, 2016) and socio-emotional expression (Geiger, Shpigelman, & Feniger-Schaal, 2020). However, previous research largely focused on these compartments, with a cognitive, artistic or therapeutic approach, but none of them included the intervention within a wider project to support the well-being of people with ID.

Finally, the effects of creative training on the development of specific skills in people with ID have been previously investigated, showing promising results not only in terms of creative performance, but also in reducing dysfunctional behaviors (Malley, Dattilo, & Gast, 2002) and in improving self-expression and individual growth (Reynolds & Prior, 2003). However, although these studies are encouraging concerning the possibility of creating group activities that stimulate expressiveness, they are based primarily on artistic activities while, to the best of our knowledge, there are no studies of creative training based on cognitive stimulation. We believe that a systematic training of divergent thinking could be of great interest in this section of the population, which is often matched to evidence of poor performance compared to expectations in a very large number of activities.

## 2. Aims and hypotheses

Considering only a handful of studies regarding this subject have been published, we decided it could be of great interest to investigate how creative, cognitive, and emotional skills are related to each other in this specific population. More in detail, in the present paper, we tried to address the following research questions: are creative skills constrained by attention or memory limits? Which is the level of emotion comprehension and what is the relationship with creative thinking? Finally, we were interested in understanding if creative skills were somehow related to personal autonomy and to the ability to have effective relationships with the service providers. In fact, the aims of our research were to exploit the potentiality of a creativity training and we needed to know if certain social aspects, which

could be specific to each individual, could limit its feasibility, applicability or effectiveness in real contexts.

To pursue these aims, we recruited a pilot sample of 5 adults with ID from a social cooperative and submitted participants to a series of tasks and questionnaires covering the domains of interest. We further performed correlational analyses between creativity scores and all the other variables to find the most meaningful connections to be targeted for future intervention.

We expected to find distinct and specific correlations between different subcomponents of creative thinking and cognitive and emotional competences and to find a correlation between creativity and social-relational skills, more precisely with the fluency and flexibility components. Indeed, we argued that the capacity to produce numerous and different solutions and answers in creative tasks could be related to more ecological competences in solving everyday problems, that can be inferred by personal autonomy and by the ability to build meaningful relationship. Finally, we hypothesized that the creative performance could be mediated by abstract thinking, which can be helpful also in lateral, autonomous, and divergent thinking related to the world of possibilities.

### 3. Methods

#### 3.1. Sample

Five adults (3 men and 2 women:  $M_{age} = 34$ ,  $SD = 7.2$ ) with mild to severe ID, who refer to an Italian socio-educational center of the social cooperative Archè (Inzago, Italy), took part in the research. All users were right-handed. Four users had normal or corrected-to-normal visual acuity, while one user was partially sighted. For this reason, the materials presented were adapted for size and brightness to facilitate the administration and an adequate comprehension. Users and their legal representatives were informed of the research procedures and purposes. The participants' legal representative read and signed the informed consent form. In addition, 6 social educators, 5 women and 1 man ( $M_{age} = 41$ ;  $SD = 5.89$ ), also took part in the research after reading and signing the written informed consent.

### 3.2. Instruments

#### *Cueing Task*

A computerized version of the Posner paradigm (Posner, 1980) was developed by modifying a script from Millisecond. The task assesses an individual's ability to perform an attentional shift. The present variant is that of the Highlight Cue Task in which participants were shown a screen with two small squares positioned on the left and right of the center of the monitor. For each trial, one of the two panels lighted up almost imperceptibly, attracting the attention of the participant who, however, had to keep his/her eyes on the center. After 25-500 milliseconds a star appeared in one of the two squares, which corresponded to the cued (congruent condition) or the uncued stimulus (incongruent condition). Participants were asked to press the space bar as quickly as possible when the star appeared. The task included 76 trials of which 58 congruent and 18 incongruent.

#### *Cued Go-no go Task*

A computerized version of the cued go-no go task by Fillmore and colleagues (Fillmore, Rush, & Hays, 2006) was created by modifying a script from Millisecond. This task is thought to provide a measure of inhibitory control. In fact, the cue provides preliminary information regarding the type of target stimulus that is likely to follow. The cues have a high probability of signaling the correct target. Inhibitory and activational tendencies show rapid development of cue-dependence as the cues come to elicit preparatory processes for the inhibition or execution of the behavior.

A trial involved the following sequence of events: (a) presentation of a fixation point (+) for 800 milliseconds; (b) a blank white screen for 500 milliseconds; (c) a cue, displayed for one of five stimulus onset asynchronies (SOAs = 100, 200, 300, 400 and 500 milliseconds); (d) a go or no-go target, which remained visible until a response occurred or 1000 milliseconds had elapsed; and (e) an inter-trial interval of 700 milliseconds. The cue was a rectangle presented in the center of the computer monitor against a white background. The cue was presented in either a horizontal or vertical orientation. The go and no-go targets were colored green and blue, respectively. They were displayed on the monitor as a solid hue that filled the inside of the rectangle. Participants were instructed to press the spacebar as soon as a go (green) target appeared and to suppress the response when a no-go (blue) target was presented. The orientation of the cue signaled the probability that a go or no-go target would be displayed. Cues that were

presented vertically preceded the go target on 80% of the trials and preceded the no-go target on 20% of the trials. Vice versa occurred for cues presented horizontally. Therefore, vertical, and horizontal cues operated as go and no-go cues, respectively.

A test consisted of 250 trials that presented the four possible cue-target combinations. An equal number of vertical (125) and horizontal (125) cues were presented before an equal number of go (125) and no-go (125) target stimuli. Each cue-target combination was presented at each of the five SOAs, and an equal number of SOAs separated each cue-target combination. The presentation of cue-target combinations and SOAs was random. For each trial, the computer recorded whether a response occurred, and if so, the RT in milliseconds was measured from the onset of the target until the key was pressed. The test required approximately 4 minutes to complete.

#### *Bells test*

The Bells test is a cancellation task designed to assess neglect (Gauthier, Dehaut, & Joannette, 1989), but is able to evaluate visual exploration and selective attention more in general. It consists in searching for 35 elements (bells) distributed among 280 distractors. The 35 targets are distributed equally in 7 columns; each column contains the same number of bells ( $N = 5$ ) and distractors ( $N = 40$ ). All figures are black silhouettes on a white background. The columns are distributed on the right (3) and on the left (3) with respect to a central column. For the present study, in the instructions the examiner asked the participant to make a circle around each bell trying not to waste too much time, but at the same time not to forget any. The test ended when the participant believed he or she had identified all the targets. Before the actual test, the examiner proposed to the participant two exercises to practice on small sheets: the first containing only bells to be circled, the second containing some bells with distractors. In both cases, the examiner began the exercise by placing the first circle around a bell as an example.

To make the test accessible to everyone, the table was printed in A3 format. The overall execution time and accuracy (hits) were noted. None of the users committed false alarms.

#### *Raven Progressive Matrices*

The Progressive Matrix test consists in the presentation of incomplete figures whose missing part must be identified. The version administered for this research was the SPM Standard Progressive Matrices (Raven, 1989),

which is made up of 60 items divided into 5 series of 12 tests each, ordered by increasing level of difficulty. The missing part must be identified among 6 or 8 other drawings. The model figures include graphic motifs that change from left to right and from top to bottom. The subject must understand the underlying logic and apply them to reach the solution. The test measures general non-verbal cognitive functioning.

#### *Rey-Osterrieth Complex Figure B Test (ROCF-B)*

ROCF-B is a simple test that explores constructional praxis and visuospatial memory. With respect to version A, it is easier and more informative, and can be administered to children (Rey, 1983) and to people suffering from dementia (Luzzi, Pesallaccia, Fabi, Muti, Viticchi, Provinciali *et al.*, 2011) and intellectual disabilities (Di Guardo, Buono, & Di Nuovo, 1997). It consists in the copy and recall of a geometric drawing containing 4 overlapping figures with small details ( $N = 7$ ). For the present study, we used the original ROCF-B in three different tasks: 1) Copy: the subject was asked to accurately copy the model showed in front of him; 2) 3-min reproduction from memory: the participant was engaged in verbal tasks for 3 min and was then asked to reproduce from memory the figure he/she had previously seen. 3) 30-min reproduction from memory as point 2. The scoring was conducted following the instructions of the original manual (Knight & Kaplan, 2003), which are also clearly reported in an Italian work from Luzzi and co-workers (Luzzi *et al.*, 2011). It involved assessing the number of figures, the proportion, the presence of overlapping, and the precision in drawing the details, for a total maximum score of 31 points.

#### *Corsi Block-Tapping Task*

The Corsi Block-Tapping Task is used for the assessment of visuospatial short-term memory. Originally developed by Corsi (Corsi, 1972), it is a span task and entails simple measurements that can be administered also to people with different types and levels of impairment. The task consists of nine cubes, which are numbered on the examiner's side. They are mounted on a wooden board. The examiner taps a sequence of blocks, which the participant must repeat subsequently in the correct sequential order. After 3 different correct patterns (out of 5), the length of the sequences is increased to measure the capacity of the visuospatial short-term memory. The span corresponds to the length of which 3 out of 5 series have been correctly reproduced (Barletta-Rodolfi, Gasparini, & Ghidoni, 2011).

*Free and Cued Selective Reminding Test (FCSRT)*

The FCSRT-12 (Buschke, 1984) is a memory test that emphasizes encoding specificity. In fact, the test is divided in three different parts: the study phase (encoding), the recall phase, and the delayed recall phase.

In the first phase (study phase), the participants were required to point and name 12 items corresponding to the semantic category given by the examiner, 6 representing biological entities and 6 man-made artefacts. The 12 items were subdivided in 3 different sheets (4 items/sheet), that were presented consecutively. After each item of the sheet was named correctly, the examiner removed the sheet and asked the participant to recall the 4 items. If any of the items was missing, the examiner showed the sheet again until the participant recalled all of them correctly. The same applied to the following sheets. Indeed, we chose this test because it contains simple materials and allows a gradual encoding of a restricted number of items.

In the second phase (memory phase), participants were submitted to 3 series of recall trials. For each series, participants were asked to make a free recall (immediate free recall, IFR: 0-36) after an interference task (backwards counting) within 2 minutes. The examiner took notes of the recalled items, and then suggested the category of the missing items (cued recall). After this phase, an immediate total recall (ITR) index was calculated as the sum of IFR and the cued-recalled items (0-36). If some items were not recalled despite the semantic cue, the examiner revealed the name of the missing items.

The third phase (delayed recall phase) consisted in a one-shot recall test after 30 minutes of non-verbal tasks, with both free and cued modalities. Here, a free delayed recall (FDR: 0-12) and a delayed total recall (DTR: 0-12) were calculated. Also, the number of intrusions was calculated.

Finally, an index of sensitivity of cueing (ISC) was computed as  $(ITR - IFR) / (36 - IFR)$  with a 0-1 range. This index reflects the effectiveness of semantic cues to improve the recovery of stored words and represents the share of words missing on free recall, which are recovered by cueing (Girtler, De Carli, Amore, Arnaldi, Bosia, Bruzzaniti *et al.*, 2015). The computation of such index is usually performed to distinguish Alzheimer's disease (AD) from other kinds of impairments. In fact, AD patients show a reduced or absent effect of semantic cueing while in case of different memory difficulties cueing has been shown to induce an improvement or even a normalization of memory performance (Frasson, Ghiretti, Catricalà, Pomati, Marcone, Parisi *et al.*, 2011). In our case, we were interested in

exploring the benefits of cueing to infer the presence of reduced attentional resources or ineffective recall strategies.

### *Verbal Fluency Test*

The verbal fluency test (Novelli, Capitani, Vallar, & Cappa, 1986) allows a rapid and efficient evaluation of the ability to evoke words. For the aims of this study, we proposed both a phonemic and a semantic fluency test, in which the participant was asked to list as many words as possible after being suggested the initial phoneme (F, P, L) or a semantic category (animals, fruits, colors). The experimenter also informed the participant that it was a time task, and that he/she had 1 minute to complete each letter or category. The experimenter took note of all the words listed and, after removing errors and repetitions, he/she calculated the total number of words by letter and category by adding the 3 sub-tests. The test provides an index of both linguistic and executive efficiency, as the performance reflects the size of the lexical storage, the ability to access the lexicon, the lexical organization, and the use of strategies.

### *Test of Emotion Comprehension (TEC)*

The TEC (Pons & Harris, 2000) was devised to assess the development of the nine components of understanding of emotions in children based on the following stages: I Recognition of facial expressions of emotion; II Understanding external causes; III Understanding the link between desires and emotions; IV Understanding the link between beliefs and emotions; V Understanding the influence of reminders on the present emotions; VI Comprehension of the regulation of an experienced emotion; VII Understanding the possibility to hide emotional states; VIII Understanding mixed emotions; IX Understanding moral emotions. For the present study, we used the Italian version of the task (Albanese & Molina, 2008).

It consisted in a picture book composed of 23 cartoon scenario boards and available in both male and female versions. For the first five boards, the task consisted in identifying the correct facial expression corresponding to the target emotion, selecting one option from among four possible choices. The following boards depicted a story represented at the top of the page whose main character's face was left blank. The task here was to select the appropriate emotion for the story character from among four choices placed at the bottom of the page, based on the story read by the examiner. There was a subtotal score for each component, and a global score (ranging from

0-9), which represented the acquisition of the nine components (Cavioni, Grazzani, Ornaghi, Pepe, & Pons, 2020).

Even if the test is conceived for children, we chose it for its ease of administration. We could not find a simple test to assess emotions in adults whose difficulty could be suitable to our sample. Moreover, the scenarios were not presented in a childish way, so we believed the items to be anyhow appropriate and familiar to our participants.

#### *Parallel lines – Torrance Test of Creative Thinking (TTCT)*

The parallel lines test was taken and modified from one of the tasks included in the TTCT (Torrance, 1987). For the present study, we used the Italian version of the test (Sprini & Tomasello, 1989). It consisted in a white sheet with pairs of parallel lines that could be used as a starting point to draw whatever the participant wished to depict, in a completely free and creative way. To adapt the task to our sample, we used just one sheet (A4 format) with 6 pairs of lines.

We used the Italian manual to assess the creativity of the drawings. Four criteria were included: fluidity (as the number of given answers minus repetitions or irrelevant answers); flexibility (as the number of different categories within which the subject's responses could be classified); originality, which assessed the degree of imagination from 0 to 3 for each drawing; elaboration (as the number of additional ideas to the minimum basic idea). One point was given to each additional idea. Also, a comprehensive index (TOT\_Lines) was calculated as the sum of the previous ones.

#### *Emotion Visual Analogue Scale (VAS)*

A VAS was created taking inspiration from the Positive And Negative Affective Scale for children (PANAS-C; Laurent, Catanzaro, Joiner, Rudolph, Potter, Lambert *et al.*, 1999). The scale was composed by 16 items selected from the original 27: 4 related to joy, 4 related to fear, 4 related to anger, and 4 related to sadness. All unnecessary items or items that were too difficult to understand were removed. The participants were asked to indicate how often they felt each emotion state within the past 2 weeks by using a simplified Likert scale with just 3 steps (never, sometimes, often). Such amendments were designed and implemented by the psychologists and the educators together in order to provide an adequate understanding to the users and to obtain reliable data.

### *Questionnaire on personal autonomies*

A questionnaire was built to explore the autonomy of the participants with respect to some areas of interest: Understanding and communicating (6 items), Moving around (5 items), Personal care (4 items), Interacting with people (6 items), Social life (3 items). For the construction of the questionnaire, we took inspiration from the World Health Organization Disability Assessment Schedule (WHO – World Health Organization, 2000), which assesses the level of functioning of the person with disabilities in line with the bio-psycho-social model. The questionnaire was submitted to all the referring educators of the users. Subsequently, a total average of the scores was calculated for each area of competence. The instructions required indicating the degree of ability that each user had in carrying out each described activity, from 0 (not at all capable), to 3 (very capable). The range of scores went from 0 to a maximum of 72 points.

### *User-Educator Relationship scale*

The questionnaire on the relationship between user and educators was created taking inspiration from the Dutch version (Koomen, Verschueren, van Schooten, Jak, & Pianta, 2012) of the Student-Teacher Relationship Scale (Pianta, Hamre, & Stuhlman, 2003) but including some additional items (for a total of 34) compared to the original 28. The questionnaire is used to measure teachers' perception of the relationship established with their students (ages 4-8). The items refer to 3 main factors that measure conflict (REL-Co), closeness (REL-CI), and dependence (REL-D). Conflict refers to the degree to which a teacher perceives teacher-student interactions as negative, discordant, unpredictable, and unpleasant; closeness reflects the degree of openness, warmth, and security in the relationship; and dependency indicates an inappropriate level of excessive overreliance and possessiveness of the student in the relationship.

For the purposes of this study, the items were kept identical in content, but transformed with respect to the context of the center's activities. Educators were asked to evaluate their degree of agreement with respect to each statement using a Likert scale ranging from 1 (certainly does not apply) to 5 (certainly applies). For each user, the scores were calculated for each subscale by using the average of the responses of all the educators.

### *Simulation about daily-life activities*

To explore the relationship between cognitive and emotional components and the ability to solve simple problems in everyday activities, we also

proposed users a practical test which consisted of a short and well-known simulation characterized, however, by an unexpected problem to manage. The activity was conducted by a psychologist in the presence of two educators who, knowing in depth the habits and skills of the users, could observe and compile a grid built specifically to measure, through 6 items, the level of autonomy in relation to: I) the consequentiality of the procedures; II) the presence of strategic thinking; III) the adoption of an appropriate behavior; IV) a correct management of time; V) the presence of adequate motivation; VI) the accuracy level of the performance. Each activity received a score for the autonomous performance, or following the conductor's intervention, on the user's capabilities (from 1 to 4).

In addition, there were 4 multiple choice questions that assessed whether the instructions were understood (VII), if the user could keep the instructions in memory (VIII), if the user could manage his/her emotions (IX), and if he/she was able to adapt to the new problem (X) (0: no; 1: needs support; 2: yes). Finally, a general item (XI) asked if the task had been completed (yes/no).

For the statistical analyses, a quantitative score was calculated as the sum between items I-VI (considering both the autonomous and guided execution) and VII-X, plus a qualitative indication on the resolution capacity of the task (item XI).

### *3.3. Procedure*

The research was conducted in dedicated spaces at the Arché Social Cooperative (Inzago, Italy), so that educators and users could feel comfortable. Data collection was carried out first with the educators and then with the users.

I) Educators: in a first phase, educators were asked to complete the personal autonomies questionnaire, and the user-educator relationship scale. To facilitate the compilation, a grid was created so that each operator could provide his/her own answers in relation to each user. The compilation of the questionnaires took place in a group, in a large and quiet room, to allow operators to proceed with the self-compilation. This phase required about 30 minutes.

II) Users: the collection of data with users was divided into 4 different sessions: the first two sessions were dedicated to computerized and paper and pencil tests; the third to the problem-solving test in daily-life activities; the fourth to the completion of the mood VAS.

Session 1 and 2: the tests were administered in a quiet room of the cooperative during the center's opening hours. In addition to the examiner psychologist, each user was supported by a reference educator. The tests were subdivided over two days in order to avoid an excessive workload and were distributed considering their difficulty and respecting the alternation between verbal and visuo-spatial tests. When necessary, a short break was proposed between one test and another. Computerized attention tests were administered at the beginning of both the first and the second meeting to obtain the most reliable data possible concerning attentive efficiency. Each session lasted about 1 hour.

Session 3: during the third meeting, users faced the simulation of everyday situations. The test took place for each individual in the same place and with the same materials, which were usually made available in the center's activities. In addition to the psychologist, two educators were present with the function of observers, plus other guests as described earlier. The test ended for everyone within 30 minutes.

Session 4: finally, the users completed the mood questionnaire alongside the psychologist and the educators who, in case of need, were able to promote the full understanding of the items and to support users in the compilation, which lasted about 10 minutes.

## 4. Results and data analysis

To explore the relationships between the creative scores and other cognitive/emotional skills, we performed non-parametric Spearman correlations among creativity scores in the Parallel lines task (fluency, flexibility, originality, and elaboration) and all the other cognitive and emotional dependent variables. We further also ran non-parametric partial correlations between Parallel lines scores and the other dependent variables, net to the scores in the Raven test as a measure of non-verbal intelligence. Indeed, we were interested in measuring the degree of association between these variables by controlling for the possible confounding effect of reasoning proficiency, which could influence both creative and cognitive-emotional scores.

### 4.1. Creativity and Attention

The analysis revealed significant positive relationships between the HITS percentage in the Cueing task and the Fluency and Flexibility measures of

creativity ( $\rho = .973; p < .01$ ). Also, significant negative correlations emerged between Fluency and Flexibility and the number of anticipations ( $\rho = -.88; p < .05$ ) and omissions ( $\rho = -.97; p < .01$ ).

#### *4.2. Creativity and Non-verbal Intelligence*

The analysis revealed significant positive relationships between Raven Progressive Matrices scores and the Elaboration measure of creativity ( $\rho = .95; p < .05$ ).

#### *4.3. Creativity and Memory*

The analysis revealed significant positive relationships between the Originality measure of creativity and the scores at the FAC test (verbal memory), such as IFR ( $\rho = .9; p < .05$ ), ITR ( $\rho = .98; p < .01$ ), DTR ( $\rho = .95; p < .05$ ), and ISC ( $\rho = 1$ ). In addition, originality correlated also with non-verbal memory, which was the scoring obtained in the delayed recall of the Rey-Osterrieth Complex Figure B Test (30 minutes) ( $\rho = 1$ ).

#### *4.4. Creativity and Emotions*

The analysis revealed significant positive relationships between the Fluency and Flexibility measures of creativity and the TEC total score ( $\rho = .89; p < .05$ ). Moreover, results showed significant negative correlations between the Fluency and Flexibility measures of creativity and the self-assessment of negative emotions, such as Sadness ( $\rho = -.92; p < .05$ ) and Fear ( $\rho = .89; p < .05$ ).

#### *4.5. Creativity and Personal Autonomy*

The analysis revealed significant negative relationships between the Fluency and Flexibility measures of creativity and the Closeness scores, as assessed by the educators with the User-Educator Relationship scale ( $\rho = -.95; p < .05$ ). In addition, results showed significant positive correlations between the Originality measure of creativity and the Understanding and Communicating ability ( $\rho = .9; p < .05$ ), as measured by the Personal Autonomy Scale, as well as with the Interacting with people ability ( $\rho = .9; p < .05$ ). Moreover, the Fluency and Flexibility measures of creativity proved to be positively correlated with the Moving Around ability ( $\rho = .95; p = .05$ ).

#### 4.6. Partial correlations

Results from the non-parametric partial correlations highlighted the presence of a significant positive relationship between both the Fluency and Flexibility measures of creativity and the accuracy in the Cueing task (for both:  $\rho = .95$ ;  $p < .05$ ), and a negative relationship with the number of omissions ( $\rho = -.95$ ;  $p < .05$ ) and anticipations ( $\rho = -.95$ ;  $p < .05$ ).

Moreover, the originality scores in the Parallel lines positively correlated with the ITR scores in the Free and Cued memory task ( $\rho = .97$ ;  $p < .05$ ), as well as with the DTR ( $\rho = .96$ ;  $p < .05$ ) and the ISC ( $\rho = 1$ ). Finally, Originality was positively correlated with the accuracy in remembering and drawing the Rey Figure after the 30 minutes recall ( $\rho = 1$ ).

### 5. Discussion

Individuals with intellectual disabilities have severe impairments related not only to the cognitive area, but also to the emotional and relational spheres. This is true in both severe, moderate, and mild forms. More specifically, the difficulties in regulating emotions and social relationships make it difficult for people with ID to obtain an adequate satisfaction to their relational needs, leading to a decrease in perceived social support with important repercussions on the person's psycho-physical health (Alonso-Sardón, Iglesias-de-Sena, Fernández-Martín, & Mirón-Canelo, 2019). All this leads to a decreased quality of life due to the difficulty in developing skills and autonomy necessary for social life (Hensel, Rose, Kroese, & Banks-Smith, 2002).

This article describes the methodology and the results of the pilot phase of a larger study, aimed at verifying the feasibility of a series of tasks and procedures that will be used in an intervention-research setting. More in detail, the aim was to test the hypothesis of possibly using the construct of creativity in a cognitive way to capture some specific cognitive characteristics related to it and to verify the presence of significant relationships between these and other cognitive, emotional, and social skills. The data collected confirmed the feasibility of using adapted standardized methodologies with people with mild to severe cognitive disabilities (Shields, Kaat, McKenzie, Drayton, Sansone, Coleman *et al.*, 2020).

The results of the present study revealed the presence of a significant relationship between creativity and certain cognitive functions of particular interest in the context of intellectual disability. In fact, on the one hand,

participants displayed a specific difficulty in the use of divergent thinking and, in general, in all those tests requiring flexibility. This can be attributed to attentional, working memory, and analogical reasoning deficits typical of intellectual disability (Vakil, Lifshitz, Tzuriel, Weiss, & Arzuoa, 2011). However, on the other hand, the relationship between cognitive abilities and creative performance leads us to wonder whether working on the latter dimension to enhance its functioning might not also encourage the enhancement of the former.

Previously published reports have, in fact, highlighted the effectiveness of interactive and stimulating exercises in promoting the enhancement of cognitive functions and social skills (De Caroli & Sagone, 2014; Wilson, Sitbon, Brereton, Johnson, & Koplick, 2016). This does not imply that a person with cognitive impairment can actually recover resources and functions that were never fully developed through creativity. However, it is plausible that creative activities can promote the recruitment of developed resources and of all those residual capacities that result to be vital for the maintenance and enhancement of a good quality of life (Dew, Collings, Dillon Savage, Gentle, & Dowse, 2019). Think of the possibility of extending the range of autonomies as much as possible, of the support of self-efficacy, of the improvement of the behavioral and emotional skills, of the greater involvement in maintaining sustained attention and the cognitive load of working memory.

Our results also revealed a positive correlation between basic skills, creativity, and the dimensions of emotionality and autonomy, confirming the potential of creative training to produce a positive impact on the quality of life of people with intellectual disabilities.

More in general, the study tested the usability and potential of the SoCraTEs protocol aimed specifically at helping to improve the quality of life of people with moderate and severe cognitive impairment. A training protocol, which is based on a broad and complex view of disability that must be understood as a specific quality of the person's experience and not just as a "simple" lack or impairment (Schalock, Luckasson, Tassé, & Verdugo, 2018).

It is our opinion that creative training can be particularly useful in achieving greater autonomy and a better quality of life in people with cognitive disabilities for several reasons. First, creative training does not require high meta-cognitive skills, as it prompts the person to directly activate the cognitive resources through activities with strong emotional and motivational impact. As a result, the individual's implicit capacities are

tapped, without the need to understand difficult deliverables or have to think through the function and purpose of the proposed activities (see, for example, the study by Cannella-Malone, Konrad, & Pennington, 2015). Indeed, these are self-justifying activities, which engage the person directly and quickly, fueling curiosity and interest. However, this does not preclude a subsequent activity of reworking what has been done. In fact, a second important advantage of creative training consists in the intrinsic possibility of generating a product that can be appreciated both by the person who has "created" it and by other actors in the context, such as educators, psychologists, relatives, or peers. This product (be it a drawing, a 3D model, a writing) can be easily used to create a "meta-cognitive" context within which operators (or other actors) and users can reflect on, recalling both the process through which it was possible to realize it, as well as the perceptual and emotional characteristics associated with the product itself (Lambert, 2017). In this way, the person is called upon to reflect on what was done, on what is associated with it, on the cognitive, emotional, and social resources that were used during the activity, as well as recalling important memory processes capable of linking the product with past experiences and potentially with future activities. In this way, it is possible to activate the functions of prospective memory.

More specifically, a multi-method approach, such as SoCraTEs, which exploits the potential of a creative training in a system of stimulation, involvement and empowerment, is flexible and easily adaptable to the specific needs of the person and the application setting. The preliminary data we collected, in fact, indicates the importance of also considering some individual characteristics and in particular non-verbal intelligence, measured in our case through Raven's matrices. This tool provides an excellent assessment of abstract intelligence, which is not mediated by language and general knowledge, thus being particularly interesting in the context of intellectual disability. The existence of an inverse relationship between abstract reasoning and the performance on creativity tests implies that the activities performed, and related expectations, should be declined by virtue of the preserved cognitive resources, regardless of the emotional and social support that can be provided within the training. This does not mean that it is not possible to apply the same method, but that the strategies of involvement, the timing of application, the levels of difficulty, and the expectations of the results must be considered in relation to the starting cognitive level.

In conclusion, we are convinced that the preliminary results obtained by our study support the implementation of the SoCraTEs program in a research-intervention context, based on a global vision of the person and on the possibility of stimulating the cognitive, emotional, and social functions of the person without implying a cognitive overload and generating, at the same time, a good motivation and an excellent degree of involvement. By favoring the implicit-explicit, emotional-cognitive, social-support-autonomy dynamics, our program will allow to exploit individual and contextual resources in order to support self-efficacy related to different activities that will then be fundamental to support individual autonomy. In addition, it will be possible to train all those cognitive activities that allow, within the boundaries of the individual's intellectual level, to address, in a more flexible way, those problem-solving processes that are fundamental when one is called to face problems that cannot be addressed directly through routine processes (Eldevik, Jahr, Eikeseth, Hastings, & Hughes, 2010). The ability to foster divergent thinking and originality are, in fact, intrinsic in creative processes, thus facilitating the emergence of adaptive, rather than reactive, cognition.

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