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ORIGINAL ARTICLE

Assessing autonomous motivation in students with cognitive impairment[†]

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Abstract

Background Applying Benson's program of validation (Benson, 1998) we provide evidence supporting the validity of a projective instrument that assesses the autonomous motivation of students with impaired cognitive abilities.

Method Eighty-eight grade 7–9 students diagnosed with cognitive impairment participated in this study. Participants' motivation was assessed using a projective instrument. Participants' affect, task value, and perception of the teachers as supportive were also assessed. The questionnaires were applied individually. Zero order correlation and regression analysis were conducted.

Results The study demonstrated internal relations among the observed elements of the projective instrument, as well as relations between the projective instrument with other constructs and the predictive validity of the instrument.

Conclusions The evidence provided herein suggests that the projective instrument can be used to validly measure the autonomous motivation of students with cognitive impairment.

Keywords: *autonomous motivation, cognitive impairment, projective method*

Introduction

The *Diagnostic and Statistical Manual of Mental Disorders* considers people with intelligence test scores between 70 and 85 to have “borderline intellectual functioning” (5th ed.; *DSM-5*; American Psychiatric Association, 2013). In Israel, such students usually study in special classes within mainstream schools or in special education schools. Studies have shown that the academic performance and wellbeing of students are influenced by their intelligence quotient and by their personality and motivational orientations (Deci, 2004; Zigler, 2001). However, insufficient attention has been given to the motivational orientations and the effect of the educational environment on the motivation of students with cognitive impairment. This could be partly due to the difficulty in determining a valid measurement of motivation in students with cognitive impairment.

Motivational orientation is usually assessed using self-report questionnaires (Pintrich & Schunk,

2002). However, this method is questionable when used for participants with low levels of psychological self-awareness as it decreases the measure's validity (Assor & Connell, 1992; Katz, Assor, & Kanat-Maymon, 2008). This is particularly the case with young students and students with cognitive impairment. Various other characteristics of students with cognitive impairment, such as difficulties with reading and abstract thinking (Panek, 1997), might also limit their ability to respond to self-reported questionnaires. Therefore, the motivation of these students must be assessed in other ways in order to obtain valid results (Andrews & Rose, 2010; Hutzler & Korsensky, 2010).

Projective assessment is a technique by which participants respond to ambiguous stimuli that theoretically reveal hidden emotions and internal conflicts (Meyer & Kurtz, 2006). This technique is used to assess various personality and emotional variables in people with cognitive impairment (Panek, 1997). Katz et al. (2008) developed and validated a new

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projective method for assessing autonomous motivation in elementary school students according to the self-determination theory (SDT; Deci & Ryan, 2000). Given that projective methods are less susceptible to the effects of insufficient self-knowledge, and might be able to overcome the specific problem of measuring motivation in students with cognitive impairment, it is important to assess the validity of this instrument in this context. Moreover, SDT provides a general theoretical humanistic conception of students' motivation, and also offers more practical suggestions to support the development of adaptive motivation; this means it is important to have a reliable instrument with which to assess this type of motivation in children with cognitive impairment.

The purpose of this study was to provide evidence that supports the validity (cf. Benson, 1998) of Katz et al.'s (2008) projective instrument for autonomous motivation in assessing the autonomous motivation of students with impaired cognitive abilities. Benson's (1998) program of validation includes three stages. The first is the substantive stage, in which the researcher defines the theoretical and empirical domains of the construct. This is followed by the structural stage, in which the researcher demonstrates the internal relations among the observed elements of the construct. Finally, in the external stage, the researcher tests the hypothesised relations of the construct with other constructs in its nomological network. In this article, which is based on Benson's (1998) program of validation, we discuss the literature on the assessment of motivation in general, with emphasis on motivating children with cognitive impairment (the substantive stage). We then move on to the structural stage, in which we demonstrate the internal relations among the observed elements of the instrument. Next, in the external stage, we investigate the external validity of the instrument by testing hypothesised relations of the autonomous motivation construct with other constructs in its nomological network. We conclude by examining the instruments' predictive validity. These steps also follow those proposed by Messick (1995) and the Standards for Educational and Psychological Testing (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education [AERA, APA, & NCME], 1999) for validating educational instruments.

Autonomous motivation within self-determination theory

Self-determination theory (Deci & Ryan, 1985; Ryan & Connell, 1989) posits four main types of perceived

motivations (that is, sources or reasons for intentional action) that can be placed along a continuum of autonomy. The least autonomous motivation—*external*—represents behaviours controlled by external contingencies involving the threat of punishment or the offering of a material reward rather than by volition (Ryan & Connell, 1989). The second motivation is *introjection*—behaviours controlled by the desire to avoid feeling guilty, ashamed, or unworthy and to strive for highly positive evaluations. Next, *identified* motivation is considered relatively autonomous because the person has accepted the value of the activity as his or her own. The most autonomous motivation is *intrinsic*, which involves engagement in an activity for its own sake and is characterised by enthusiasm, spontaneity, excitement, intense concentration, and joy. The four types of motivation are often grouped into two categories: controlled motivations (external and introjected) and autonomous motivations (intrinsic and identified; Black & Deci, 2000; Sheldon, Ryan, Deci, & Kasser, 2004; Vansteenkiste, Simons, Lens, Soenens, & Matos, 2005).

Within SDT, autonomous motivation is often assessed via self-report questionnaires modelled after Ryan and Connell's Perceived Locus of Causality questionnaire (1989), in which participants respond to a set of items that reflect different reasons for acting. The reasons represent the motivations that exist at different points on the perceived autonomy continuum. Young children and students with cognitive impairment may not be able to relate to such items because they may have difficulties with activities that involve symbolic, abstract, or conceptual thinking, and their ability to reply to cognitively complex sentences might be low (Malik, 2009; Panek, 1997).

The limitations of self-report measures are most visible in students with special needs but are not exclusive to this group. Consequently, researchers dealing with autonomous motivation have sought to use behavioural measures of autonomous motivation such as free choice, effort investment, and time on task to overcome the various limitation of self-reporting (King, 1995; Spangler, 1992; Thrash & Elliot, 2002). The existing behavioural measures are complex to administer and are therefore generally used only in laboratories. The administration of such a complex procedure in the field (in a classroom, for example) is cumbersome and its validation is questionable due to the difficulty of controlling various confounding variables. It can be even more problematic to use behavioural measures for people with cognitive impairment as they may experience learning disability, motor disability, sensory issues,

or concentration problems (Malik, 2009) that could interrupt the measurement of motivation. Researchers generally agree that projective methods might be the best way to assess motivation, personality, and emotional variables for people with cognitive impairment (Panek, 1997).

Motivation of people with cognitive impairment

For more than 30 years, two groups—the Peabody-Vanderbilt Group (Haywood & Switzky, 1986) and the Yale Group (Zigler, 2001)—have investigated the motivational orientations of people with cognitive impairment. Both groups describe the deficiency of intrinsic motives in people with cognitive impairment and the strong reliance on the reinforcement they receive from others. The Peabody-Vanderbilt Group view the motivations of people with cognitive impairment as dichotomous, which suggests that individual differences or learned personality traits can make people either intrinsically or extrinsically motivated. Their research also indicates that the motivation of students with cognitive impairment is more extrinsic than intrinsic, which means they will be optimally reinforced by external rewards (Haywood & Switzky 1992; Switzky, 2001).

In contrast, the Yale Group has argued that people with cognitive impairment are not simply products of their intelligence quotient but also have distinctive personality and motivational styles that influence their performance. They have argued that motivation may prove to be the most important determining factor of performance for people with low levels of intellectual abilities. Furthermore, as people with cognitive impairment often experience failure, discouragement and expectation of failure in new tasks can reduce the willingness to develop new skills and lead to lower aspirations and diminished engagement (Robinson, Zigler, & Gallagher, 2000; Zigler, 2001). Although Zigler's view differs markedly from the SDT view with regard to motivation, the two share similar opinions about the centrality of the environment and personal experience on the type of motivation adopted. However, the SDT suggests that motivational orientation (although learned) develops primarily due to the level at which the environment supports one's needs. The SDT also suggests that, regardless of the person's current orientation, the use of external control will diminish autonomy and be associated with poor wellbeing (Deci, 2004). All of these suggestions have been extensively assessed with mainstream students but rarely among students with special needs, particularly those with cognitive impairment.

Projective assessment in people with cognitive impairment

In a projective assessment, participants respond to ambiguous stimuli that theoretically reveal hidden emotions and internal conflicts. The theory is that when people are exposed to concrete stimuli, they respond with their conscious minds, whereas ambiguous stimuli can provoke responses from the subconscious. This can give the test administrator a better idea of what is going on in the participants' minds (Meyer & Kurtz, 2006).

Projective assessment has been used since the 1930s to assess various personality and emotional variables in people with cognitive impairment (Panek, 1997). This technique is believed to be most accurate for assessing people with cognitive impairment, as well as young children (Reiss, 2004), because these groups are more comfortable "telling stories" than speaking directly about their personality or behaviours (Hurley & Sovner, 1985). Moreover, the projective technique, in which participants do not describe their emotions and thoughts directly, could help allay the submissiveness or acquiescence that is common in people with cognitive impairment (Finlay & Lyons, 2002). Finally, it is easier to evoke a projective response than to respond to a set of questions that may be too complex, either grammatically or in terms of the type of judgements they request (Finlay & Lyons, 2002). The most frequently used personality assessments for people with cognitive impairment are the projective Thematic Apperception Technique (TAT; Morgan & Murray, 1935) and the Apperceptive Personality Test (APT; Karp, Holmstrom, & Silber, 1989). However, neither of these tests assesses autonomous motivation according to the SDT.

Katz et al. (2008) developed and validated a new projective method for assessing autonomous motivation in elementary school students according to the SDT (Deci & Ryan, 2000). Given that projective methods are less susceptible than questionnaires to the effects of insufficient self-knowledge, and might overcome the specific problem of measuring motivation in students with cognitive impairment, it is important to assess the validity of this instrument in this context.

The current study

The purpose of this study was to validate the use of Katz et al.'s (2008) projective instrument for assessing motivation in students with cognitive impairment. Previously, a comprehensive validation

program was conducted to validate this instrument for use with mainstream students. In the second (structural) stage of content validation (Benson, 1998), we investigated the internal relations among the observed elements of the instrument; specifically, the subscale intercorrelations. We hypothesised that the projective subscale of controlled motivation and the projective subscale of autonomous motivation would show a negative correlation and demonstrate the opposite pattern of correlations with the other variables. This would suggest that (as Katz et al., 2008, found) these two components are indeed located on opposite sides of the same dimension when assessing the motivation of students with cognitive impairment.

In the third (external) stage of content validation, we examined the correlations of the projective indicator of autonomous motivation with two well-known self-report scales of affectivity and value. One was an affectivity scale called the Positive Affect Negative Affect Scale – Children (PANAS-C; Laurent, Potter, & Catanazaro, 1994; Laurent et al., 1999) and the other was a measure of task value (Eccles, Wigfield, Harold, & Blumenfeld, 1993). Several studies have found a pattern of positive high correlations between autonomous motivational orientations and positive affect (Deci, 2004; Katz et al., 2008; Katz, Kaplan, & Buzukashvily, 2011; Katz, Kaplan, & Gueta, 2010). Accordingly, we hypothesised that the type of motivation students adopt toward learning in school, as measured by the projective instrument, would correlate with scales that assess affect. Specifically, we hypothesised that autonomous motivation would correlate positively with positive affect and negatively with negative affect.

We also suggested that there are possible relations between autonomous motivations, as measured by the projective instrument, and task value, as measured by the “task value measure” (Eccles et al., 1993). Eccles (Parsons) et al. (1983) outlined four components of task value: attainment value, intrinsic value, utility value, and cost.

We hypothesised that autonomous motivation, as assessed by the projective instrument, would correlate positively with the measure of task value, as the two elements share similar constructs (identified and intrinsic motivation as similar to intrinsic value and utility value). This measure also captures the notion of perceived ability, which, according to SDT, promotes autonomous types of motivation.

Following Benson’s (1998) third (external) stage, we also assessed the instrument’s predictive validity. Specifically, we assessed whether the projective instrument can predict the well-established and

well-researched relations between teachers’ supportive behaviours and students’ types of motivation.

Recent educational motivational research has focused on the role that the educational environment plays in the patterns of students’ motivation (Eccles et al., 1993; Katz, Buzukashvili, & Feingold, 2012; Katz et al., 2010, 2011; Reeve & Jang, 2006; Skinner & Belmont, 1993; Vallerand, 1997). In providing support for children’s psychological needs, parents and teachers contribute to the internalisation of their children’s motivation for activities (Assor, Kaplan, & Roth, 2002; Deci & Ryan, 1985; Furrer & Skinner, 2003; Reeve, 2009; Reeve & Jang, 2006; Vallerand, Fortier, & Guay, 1997). The validity of the projective instrument for students with cognitive impairment will be supported if this relationship, which is visible and well established in SDT research with mainstream students, is also visible among students with cognitive impairment. We hypothesised that the degree to which students perceive their teachers’ behaviour as supportive of their (the students’) psychological needs will predict the type of motivation the students adopt toward learning as measured by the projective instrument.

Method

Participants

This study involved 88 Israeli students in grades 7–9 (53 males, 35 females) from six special education classes in two mainstream schools (61 students) and four classes in a special education school (27 students). The average age of the students was 13.52 years ($SD = .72$, range: 13.2–15.6). The average intelligence quotient of students was 74.4 ($SD = 2.75$). The students were diagnosed by authorised educational psychologists using the Wechsler Intelligence Scale for Children – Revised (WISC-R; Wechsler, 1974). This test is mandatory in Israel before a student is placed in special education classes or schools. Students within the special education systems are obligated to take this test every 7 years.

Procedure

The study was conducted during school hours. Ethics approval was authorised by the Israeli Ministry of Education. Permission was received from the schools and the students’ parents. The following steps were taken to overcome the various limitations of using self-report questionnaires with students with cognitive impairment. First, the questionnaires were administered individually to each student in a quiet room by a trained research assistant. Second, to

reduce misunderstanding caused by reading difficulties, the research assistant read all the items aloud to the students. Third, all participants' responses were verbal; the participants did not have to write or mark anything. Fourth, the Likert scale included images; evidence suggests that pairing visual images in questionnaires facilitates responses in young children, which is also believed to extend to the population at hand (Harter & Pike, 1984; Verschueren, Marcoen, & Schoefs, 1996). Questionnaires with pictures instead of text are often used in situations in which reading ability could create barriers (Reynolds & Johnson, 2011; Zhang, Smith, Lam, Brimer, & Rodriquez, 2002).

An experimenter met with each student individually for one or two sessions (depending on the students' ability and willingness to participate). To control for possible order effects, the projective instrument was placed either at the beginning, in the middle, or at the end of the questionnaire.

Measures

The *projective instrument of relative autonomous motivation* was developed by Katz et al. (2008). Participants were presented with three TAT-like pictures. The first picture depicted a child lying in bed (the gender of the child in the image corresponded to the gender of the participant), accompanied by the following sentence: "The child in the picture will go to school soon." The second picture portrayed a child and a woman standing near a door, with text that read: "The child in the picture is on his/her way to school." The third picture showed the child walking outside, with a caption reading: "The child is on her/his way back home from school." All pictures were accompanied by the following questions: "What does she/he feel? What is she/he thinking?"

As guided by Katz et al. (2008), students' answers were separated into 10 indicators representing autonomous and controlled motivation. Five of the indicators represented autonomous motivation, as follows: (1) a wish to do more of the same activity (e.g., "He feels he wants to go back to school," "She is thinking of what she will do at school tomorrow"); (2) feelings or actions involving choice (e.g., "He knows he could choose what to study today"); (3) participation motivated by desire (e.g., "She wants to go to school"); (4) interest (e.g., "He was very interested in school today"); and (5) enjoyment (e.g., "She thinks about how much she enjoyed the class"). The other five indicators represented controlled motivation: (1) introjection (e.g., "She feels she has to go or else she will feel bad"); (2) coercion (e.g., "He has to go; they force him to do it"); (3)

unwillingness to engage in the activity (e.g., "He feels he doesn't want to go to school"); (4) boredom (e.g., "He is thinking about how boring school was today"); and (5) frustration (e.g., "He is frustrated").

Motivation scores were derived from students' responses using a four-step process. First, for each of the 10 indicators, we counted the number of times the indicator appeared in each story. Because an indicator could appear more than once in a given sentence, the total indicator score for a story was the literal count of the appearances of the indicator in the story. Second, the count scores of each indicator in the three stories were summed, which resulted in five indicator scores (across stories) of autonomous motivation and five indicator scores (across stories) of controlled motivation. The count scores of the five indicators of autonomous motivation were then added together to provide a score representing autonomous motivation, and a similar procedure was applied to the five indicators of controlled motivation. This procedure yielded two overall motivation scores: autonomous and controlled. The correlation between the autonomous and controlled components was negative ($r = -.42, p < .01$). Finally, we created a global indicator of relative autonomous motivation by subtracting the score representing controlled motivation from the score representing autonomous motivation, as suggested in previous research (Black & Deci, 2000; Katz et al., 2011; Sheldon et al., 2004; Vansteenkiste et al., 2005).

The children's affects while studying in school were measured by the version of the PANAS-C developed by Laurent et al. (1994, 1999). This measure is composed of two scales: positive affect (PA) and negative affect (NA). Using a 5-point Likert-type scale, participants were asked to indicate how often they experienced 10 specified PA adjectives and 10 NA adjectives; we then computed summary scores for the PA and NA scales. Laurent et al. (1999) reported evidence for the reliability and validity of the PANAS-C with elementary-school-age children. Further studies supported the notion that the two-factor model of affect appears to be similar across age groups (Bushman & Crowley, 2010). The positive and negative affect subscales in the present study showed a nonsignificant correlation of .13. Cronbach's alphas for the 10 positive affect and 10 negative affect items were .81 and .77, respectively.

Students' task value of studying in school was measured with nine items that had been translated into Hebrew by Katz et al. (2010) from questionnaires developed by Eccles et al. (1993) and Eccles and Wigfield (1995). Three of these items assessed students' self-concept of ability and expectations for success in studying in school (e.g., "How good are

you at studying in school?”), another three assessed intrinsic value (interest/fun) in studying in school (e.g., “How much do you like studying in school?”), and the final three assessed the importance students ascribe to studying in school (e.g., “How useful is what you learn in school for you?”). We created an indicator of the value that students ascribe to the task of learning in school by averaging the scores on the nine items pertaining to the task value. Eccles, O’Neill, and Wigfield (2005) reported evidence for the reliability and validity of the global task value measure with elementary-school-age children. The students’ task value was found to be reliable (nine items; $\alpha = .80$).

Students’ perception of their teachers’ behaviours as supporting their psychological needs was assessed using items adopted from Katz et al. (2010). The items assessing perceived teacher support of autonomy included items that tapped teachers’ behaviours, such as showing an understanding of students’ perspectives, providing a relevant rationale for a task, offering choice, and allowing criticism (e.g., “The teacher provides me with a choice of tasks,” “The teacher explains what learning is good for”). The items that assessed the perceived teacher support of competence tapped teachers’ behaviours, such as setting optimally challenging tasks, helping students to plan their work, and providing informative and noncomparative feedback (e.g., “The teacher gives me tasks that are not too difficult for me,” “The teacher makes sure that I understand the task”). The items assessing perceived teacher support for relatedness tapped teachers’ behaviours, such as encouraging peer acceptance and empathy in the classroom and minimising social comparisons and competition among students (e.g., “The teacher respects me even if I do not succeed,” “The teacher takes a personal interest in me”). Previous studies (e.g., Katz et al., 2010) have shown that all of the above items are loaded on a single factor because students do not distinguish between teachers’ behaviour that supports different needs and instead treat support for psychological needs globally. The level at which students perceive their teachers as need-supportive was calculated by averaging the students’ answers. Higher scores indicated that students had a higher perception of teachers as being need-supportive. The students’ perception of their teachers’ behaviours measure was found to be moderately reliable (12 items; $\alpha = .61$).

Results

We used PASW Statistics Version 18.0.3 to analyse the data. We analysed the zero order correlation of

the instrument with other scales to assess content validity and conducted a regression analysis to assess the predictive validity of the projective instrument.

To avoid order of administration effect, the participants were assigned randomly to three different orders of instruments administration. The order of instrument administration had no effect on the size of the correlations between the projective instrument and the other measures, which suggests that the sequential order of measurement scales did not alter the pattern of responses. Table 1 presents the means, standard deviations, and the correlation between the components of the projective and the various other measures.

The correlation between the autonomous and controlled components of the projective instrument was negative. Moreover, the projective component of controlled motivation and the projective component of autonomous motivation showed an opposite pattern with the other variables.

As expected, the projective measure of relative autonomous motivation showed significant positive correlations with both positive affect and task value. The projective relative autonomous motivation measure showed significant positive correlations with teachers’ need-supportive behaviour, which was also expected.

In order to assess the predictive validity of the projective instrument, we conducted a regression analysis to examine perceived teachers’ autonomy-supportive behaviour in predicting participants’ autonomous motivation. The predictor was perceived teacher need-supportive behaviour and the dependent variable was participants’ autonomous motivation as assessed by the projective instrument. A regression analysis that predicted participants’ autonomous motivation from perceived teachers’ autonomy-supportive behaviour was statistically significant, $F(1, 85) = 14.44, p < .001$, and contributed 16% to the variance in contributions. As expected, students’ perceptions of teachers as being supportive significantly predicted the students’ autonomous motivation ($B = 2.64, \beta = .40, t = 3.60, p < .001$).

Discussion

The results of this study provide evidence regarding the validity of Katz et al.’s (2008) projective instrument in assessing the autonomous motivation of students with cognitive impairment. This measure correlates with other measures that assess similar constructs, shows internal consistency, and measures students’ autonomous motivation in their predicted

Table 1. Means, standard deviations, and zero order correlation between the components of the projective and the self-reported measures

	1	2	3	4	5	6	7
1. Projective RAM	–	.88**	–.80**	.31**	–.18	.36**	.36**
2. Projective AM	–	–	–.42**	.28**	–.29**	.25*	.28**
3. Projective CM	–	–	–	–.23*	–.02	–.38**	–.34**
4. Positive affect	–	–	–	–	–.03	.47**	.72**
5. Negative affect	–	–	–	–	–	.04	–.16
6. Teachers' support	–	–	–	–	–	–	.54**
<i>M</i>	2.20	5.40	3.20	4.10	2.10	3.90	4.00
<i>SD</i>	6.0	3.90	3.15	.66	.80	.83	.90

Note. *N* = 88. RAM = relative autonomous motivation; AM = autonomous motivation; CM = controlled motivation.

p* < .05. *p* < .01, two-tailed.

relations between teachers' behaviours and students' types of motivation.

As expected, the projective measure of relative autonomous motivation showed significant positive correlations with the self-report scales of positive affect, teachers' need-supportive behaviour, and task value.

These correlations not only strengthen the external aspect of validation of the projective instrument (Benson, 1998; Messick, 1995) but also provide information regarding the motivational mechanism of students with cognitive impairment. Specifically, the correlation between the projective measure of autonomous motivation and the various other measures suggest that autonomous motivation for these students, as with mainstream students, is related to positive emotions and improved wellbeing. Therefore, students with cognitive impairment who study due to a more autonomous type of motivation have a better emotional experience in school and higher task value.

An unexpected finding was that the projective measure of relative autonomous motivation did not show significant negative correlations with the self-report scale of negative affect. Assessing the various correlations of the negative affect measures with the rest of the variables assessed in this study shows that this measure had no significant relations with most of the other variables. This pattern might suggest that students with cognitive impairment have difficulty identifying with negative emotions presented to them as their own (applying the PANAS-C, the researcher presents the student with a list of positive and negative emotions and asks him/her to indicate the extent to which he/she identifies with each emotion). When students had to express negative emotions that were not directed to them and instead reflected another, pictorial, child, they expressed negative emotions, and the projective measure of their controlled types of

motivation show significant negative relations with all the other variables. This result increases the need to use a projective method when trying to understand certain emotional aspects of people with cognitive impairment, and strengthens the substantive aspect of validity, as suggested by Messick (1995). The finding that the projective component of controlled motivation and the projective component of autonomous motivation showed an opposite pattern with the other variables suggests that these two components are indeed located on opposite sides of the same dimension of motivation of students with cognitive impairment. This finding also strengthens the evidence of the internal structure of validity (AERA, APA, & NCME, 1999; Messick, 1995). Examining the correlations of projective relative autonomous motivation with other indicators versus the correlations of the components of this composite score with other indicators shows that the composite measure has somewhat higher correlations. This pattern, together with the fact that the components of the projective relative autonomous score appeared to lie on the same dimension, suggests that it may be better to use the more global projective relative autonomous motivation score than its components.

Although the goal of this study was to validate the projective instrument of autonomous motivation for use among students with cognitive impairment, the results highlight a few questions concerning the motivation of students with cognitive impairment that require future research.

The mechanism by which the motivational orientations and behaviours of people with cognitive impairment develops has been the subject of much research. For example, there is an ongoing discussion about whether positive and negative reinforcements are beneficial as motivators in general, and for the motivation of students with special needs in particular (Deci, 2004; Maag, 2001). With regard

to mainstream students, there is some agreement that negative reinforcements or punishment could create negative effects on students' behaviour. Yet the educational and emotional benefits of positive reinforcement are controversial (Kohn, 1993). Some research suggests that positively reinforcing students is the best way to encourage them to repeat desirable behaviour (Maag, 1996, 2001). Other theories, such as SDT, posit that positive reinforcements are actually external and therefore controlling, which diminishes students' autonomy and motivation (Deci, 2004). A similar argument exists regarding the best way to enhance motivation in students with cognitive impairment. Some studies have suggested that people with cognitive impairment tend to have lower internal motives, which means that the external incentive is believed to improve their behaviours and learning (Schultz & Switzky, 1993). These theories, which depict motivation as a consequence of "individual differences" or "personality traits," view the environment as a "secondary player" in determining an individual's motivation by adjusting the type of incentive to his/her characteristics. Other theories, such as SDT, argue that the best way to help people to develop, learn, and behave well is to help them develop intrinsic motives. This help is provided by modifying the learning environment so that it will be more supportive of students' needs. Although this issue requires further investigation, our results support this notion by showing that students with cognitive impairment react to differences in teachers' behaviours, which suggests that they (like any other students) benefit motivationally and emotionally from a learning environment that supports their needs for autonomy, relatedness, and competence. These results are especially important, as many of the students with cognitive impairment study in mainstream schools and share the same teachers' practices as other students.

However, future studies should further examine the validity of this instrument in similar students in other cultures to strengthen the "generalisability" aspect of validation (AERA, APA, & NCME, 1999; Messick, 1995). Moreover, the validity of this instrument should be measured in populations with even lower cognitive abilities. It is also important to understand the relations between students' motivation, teachers' support, and cognitively-related variables, and to identify whether motivation can predict variables such as academic achievement. Future studies could assess the differences and similarities in the patterns of response to the projective instrument of students with and without cognitive impairment. Such studies should investigate whether there are

differences or similarities in the general level of emotional/motivational expressions; whether these two groups differ in the level at which they express positive or negative emotional expressions; or even whether the content or the way they construct their expression is similar or different. Studies should reassess the high standard deviation of the relative autonomous motivation index and the relatively low internal consistency reliability of the perception of the teachers' behaviours measure. Although those findings were also obtained in previous studies with typically developing students (Katz et al., 2008), they should be further investigated as they fall into a range that could question the utility of the instruments.

This research has some methodological difficulties that should be addressed in future studies. As the research assistants were not blind to the conditions and goals of the study, their subtle differences could have unintentionally affected participant responses. The validity of the instrument used in the present study should be assessed against other instruments such as observations and interviews to avoid the questionable validity problems of self-report questionnaires.

Although Katz et al.'s (2008) projective instrument was developed for use by researchers, its easy and "friendly" administration and analysis can make it a useful tool for teachers and other educational practitioners. Further research is needed on this instrument's use in the classroom. It is important to investigate whether teachers can use this instrument to encourage students to talk about their emotions and motivation. It should also be assessed whether teachers can use it to initiate conversations between students and teachers and to help create a comfortable environment in which teachers support students' needs for autonomy (enabling them to express their feelings), relatedness (showing empathy and expressing warmth), and competence (by providing them with a means to express their feelings in a way that suits their intellectual abilities).

In conclusion, researchers and practitioners can use this projective instrument to deepen the understanding of the motivation and wellbeing of students with cognitive impairment.

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