


Motivation, Frustration Tolerance and Satisfaction Scales in School Context: Three Short Scales

Motivación, tolerancia a la frustración y satisfacción en contexto escolar: tres escalas breves


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Summary

This study proposed the design of three brief scales coherent with and contributing to the pedagogical perspective of schoolteachers, aiming to enhance self-regulated learning and psychological well-being of students. With the participation of teachers and other professionals who provided feedback throughout the process, scales for school motivation (ME), frustration tolerance (TF), and school satisfaction (SE) were designed and validated among 1260 students from 7th to 12th grade (57.7% female, mean age $M=14.9$ years, $SD=1.9$) belonging to three educational institutions in northern Chile. Descriptive, correlational, reliability, and confirmatory factor analysis (CFA) measures obtained indicated adequate psychometric behavior in all scales. As a result of the validation process, the report indicates that the instruments meet psychometric criteria for application in the school context and contribute to identifying strengths and motivational, affective, and satisfaction needs of students, relevant to their processes of self-regulated learning and psychological well-being.

Keywords: Psychometrics; Behavioral incentives; Student attitude; Conditions of learning.

Resumen

Este estudio propuso el diseño de tres escalas breves coherentes con y aportadoras a la perspectiva pedagógica de profesores escolares, para la mejora del aprendizaje autorregulado y el bienestar psicológico estudiantil. Con participación de docentes y otros profesionales que retroalimentaron el proceso, se diseñaron escalas de motivación escolar (ME), tolerancia a la frustración (TF) y satisfacción escolar (SE), luego validadas en 1260 estudiantes de 7° a 12° grado, (57.7% mujeres, edad $M= 14.9$ años, $DS=1.9$) pertenecientes a tres establecimientos educacionales del norte de Chile. Las medidas descriptivas, correlacionales, de confiabilidad, y del análisis factorial confirmatorio (AFC) obtenidas indicaron un comportamiento psicométrico adecuado en todas las escalas. Como resultado del proceso de validación, se reporta que los instrumentos cumplen criterios psicométricos para ser aplicados en contexto escolar, y aportar en la identificación de fortalezas y necesidades motivacionales, afectivas y de satisfacción en los estudiantes, relevantes para sus procesos de aprendizaje autorregulado y su bienestar psicológico.

Palabras claves: Psicometría; Incentivos del comportamiento; Actitud del alumno; Condiciones de aprendizaje.

INTRODUCTION

In the current educational context, learning processes have become associated with the primacy of cognitive factors, based on internationally standardized achievement indicators (Karpov, 2017). However, it is undeniable the need to understand the organization of students' own resources, including those affective, motivational and social ones that account for how learning is achieved from the processing and assimilation of knowledge, based on the experience of interaction with other people (Visentin, 2017) and with the task (Kim & Pekrun, 2014). There is a wealth of evidence regarding the predictive capacity of different cognitive factors (e.g., intelligence, executive functions, metacognition, and multiple other specific skills) on learning, and their association with academic performance (Archibald et al., 2019; Sánchez-Escudero et al., 2019). However, there is also a great deal of evidence from recent empirical research that indicates the relevance of considering other non-cognitive factors, highlighted within the perspective of teachers as important interactional mediators of learning (Hanushek & Woessmann, 2017; Vittadini et al., 2022).

The learning process is usually perceived as eminently individual in character, in which each person constructs his version of the world and acquires knowledge in relation to his experiences. This strong emphasis on individual cognitive factors to explain the sources of student engagement has led to the privileging of an educational paradigm centered on the individual and cognitivist understanding of the integral learning process (Gil-Velázquez, 2020), which does not sufficiently highlight other factors of a social and emotional nature, which are also involved in student engagement (Kilday & Ryan, 2019). However, the interaction of the student with his environment and with other relevant people plays a determining role for his adequate development (Taylor, 2017). These interactions offer resources and experiences that help students recognize their potential, capabilities and aspects to be strengthened, providing them with an idea of their role within the school and their personal conditions to face the challenges of learning, shaping their expectations and motivating them in this process (García-Peñalvo et al., 2016). Thus, it is proposed that the positive and negative experiences that students accumulate throughout their learning process have a transforming effect on their idea of what learning implies (Leal-Soto et al., 2022).

Assuming the fact that learning does not develop outside a given social context, which situates and gives meaning to actions and experiences (Pecher, 2018), it is necessary to consider the relevance of the teacher in his key role within the learning process. His role is that of a deeply involved interlocutor with the student, who supports the construction and consolidation of learning, guiding him in relation to the knowledge he builds and offering him the necessary pedagogical resources, from an interactive perspective (Pianta, 2016).

In order for the teacher to play this role efficiently and positively, he needs to know the aspects that the student experiences and evaluates at each moment of the learning process. Thus, both student and teacher are in the middle of the road in the process of regulating their own resources in order to contribute to the teaching and learning processes (Heritage, 2016).

In this context, the question that constitutes the main objective of the study arose: What key psychological and contextual factors should teachers recognize in their students that allow them to understand their needs and pedagogically support their learning regulation process? This question

led to the purpose of the study, which sought to determine the psychometric characteristics and factorial structure of three short instruments designed to measure school motivation, frustration tolerance and school satisfaction, as variables associated with the self-regulation of learning at school, and to detail its validation process as an instrument authorized for use in the Chilean school context.

After a review of the updated literature on psychological, socio-affective and context-related factors involved in the school learning process, these three relevant dimensions, described as facilitators and non-cognitive predictors of learning, stand out: motivation, frustration tolerance and school satisfaction (Djambazova-Popordanoska, 2016; Lega-Ruiz & Higuera-Sarmiento, 2019). Managing these three variables within the classroom facilitates self-regulation of learning (Fonteyne et al., 2017) and student psychological wellbeing (Chen et al., 2015). The teacher's recognition of these three motivational and socio-affective dimensions constitutes a relevant input of great educational value to improve the dynamics of the learning environment in a diverse classroom (Boekaerts, 2002).

The following is a theoretical description that frames motivation, frustration tolerance and school satisfaction within the described perspective of regulatory interactions of learning in the classroom.

The following sections then address the methodological aspects that guided the validation process of the instruments corresponding to these three variables. The descriptions of the participants are included, and the results were used to analyze the validity and reliability of these instruments, as well as the ethical procedures and analyses carried out. The results of the validation process are presented based on descriptive analyses that allow us to observe the associations between instruments and their coherence as educational measurement tools with effects on the dimension of psychological wellbeing. Confirmatory factor analyses are also presented, which show the factor structure and fit of the models with which they were psychometrically evaluated. Finally, the contribution and relevance of the proposed instruments are discussed and concluded.

Learning as an experience

This study starts from an understanding of learning as a result of interactive experience and not as an exclusive product of individual performance (Taylor, 2017). According to Mezirow (1996), the value of learning does not lie in its outcome, but in the process involved, in which previous interpretations are used to adjust new ones, making the experience the guide for future action. As a process, learning involves experiential aspects, personal disposition and motivational, emotional and self-regulatory resources, which contribute significantly to improving this experience within the framework of a life trajectory (Winne, 2018), and contribute to the wellbeing of the student (Bisquerra-Alzina & Hernández-Paniello, 2017).

Having evaluation tools in line with the pedagogical and formative vision of the school, with a situated vision of education that makes it possible to give meaning to the observation of the student's behavior and experiential report, before and during the learning process, is a common need

for all those actors directly or indirectly involved in the world of education, especially teachers (Taylor & Cranton, 2013).

Identifying these aspects allows us to broaden the ways of understanding and evaluating the conditions in which relevant factors are manifested, according to their influence on learning and how they are reflected in school development. Thus, from the fields of psychology, psychometrics and pedagogy, the focus is not only on obtaining good academic results, but also on the personal and experiential conditions that promote the identification and connection of people with their learning processes, and what this represents for their integral development and wellbeing.

Motivation, frustration tolerance and satisfaction: a comprehensive experience of self-regulation and educational adaptation.

Motivation and frustration tolerance have been especially studied in the framework of factors that favor self-regulation, mainly oriented to explain the self-regulated learning process as a committed action of the student, which is consistent with the characteristics of the context in which the student develops (Pintrich, 2000; Pintrich & De Groot, 1990). School motivation usually describes the drive or interest experienced by the student to achieve academic objectives (commonly referred to as academic goals). This type of motivation considers both internal and external aspects, which account not only for the level of commitment and effort that the student puts into a learning activity, but also for the reasons and expectations that justify this investment of energy and time (Alonso-Tapia, 2005).

In this regard, there are different explanatory models of motivation, including those that include a reactive description of motivation as a response to changes produced by internal or external stimuli, and others that, in an active conception of motivated behavior, define it as being closer to a purposeful component, driven by plans, goals and objectives that make sense to the person (Barberá-Heredia, 2002). In the context of self-regulated learning, motivation is considered to be influenced by the student's self-image and perception of competence, giving the student the confidence to face tasks and determining the level of commitment, participation, effort and persistence with respect to his learning process (Tardif, 1992). In this perspective, the individual is manager and reviewer of this process, in function of achieving goals or desired states (Fitzsimons et al., 2015; Panadero, 2017). However, this internal process is possible in a context in which there is support and guidance from a significant other (García & Bustos, 2021).

Frustration tolerance, meanwhile, is a relevant psychological resource of emotional response to adverse situations in which what is desired or planned is not achieved, and whose adjustment favors the direct coping of difficulties and the execution of activities (Cervantes-Arreola et al., 2018). Frustration tolerance in a school context refers to a student's ability to face and overcome obstacles, challenges or difficult situations that may arise during the learning process. This ability implies the adaptive capacity to handle stress, uncertainty and difficulty without affecting behavior, i.e., without becoming depressed, aggressive or avoiding the situation (Yu et al., 2022).

A high frustration tolerance implies the ability to withstand stressful or negative situations allowing the individual not to act impulsively, avoid or delay his response, and above all, to continue

despite adversity (Arguedas et al., 2016). Regarding the achievement of a goal, frustration appears to be directly related to motivation: the greater the motivation to achieve the goal, the greater the frustration experienced if it is not achieved (Bisquerra-Alzina, 2008). The relevance of a goal is related to its meaning within the social environment in which the person develops, as well as to the characteristics of the tasks or situations that are faced to achieve it; therefore, the context, in the case of the school, influences the personal sensitivity that students develop regarding what they learn or wish to learn (Alonso-Tapia et al., 2018). Due to this relationship between motivation and frustration tolerance, framed within the school context, self-regulation of learning requires conditions of adaptation and adjustment consistent with the sociocultural context in which it takes place (Ben-Eliyahu, 2019). Furthermore, there is evidence of a negative relationship between satisfaction and frustration that affect the integral development of the student (Salanova et al., 2010).

Self-regulated learning requires the activation of the psychological, social and affective resources that the student has, and with which the student can respond to the demands and conditions imposed by the environment (De Smul et al., 2019). Thus, with the implementation of these resources, the student is able to face the challenges and tasks of the learning process, with a meaning and purpose that is specific to the situation (De Corte, 2015). The activation of resources and capabilities in the student is consistent with the resources provided by the context, which, when perceived by the student as favorable to his learning, have a mobilizing effect, thus showing the incidence of the school on the development of the self-regulated learning process (Trías, 2017). Therefore, the student's perspective and emotions are of particular importance, to the extent that the student shapes and balances the idea of his role and goals in school based on how he participates in learning activities and the emotions associated with this process, as well as the quality of the relationship he establishes with his peer group and teachers, based on the sum of experiences of successes and failures, generating a synthesis from which he establishes his level of satisfaction with the school process (Trías, 2017).

School satisfaction is considered a feeling closely linked not only to the actual learning process, but also to the factors associated with this process (perceived support from teachers and other relevant figures in the educational environment, among others) (Rodríguez-Garcés et al., 2020). These factors make possible the emergence, for example, of participation and a sense of security for the student in the school environment, which contribute to the consideration of school satisfaction. From this perspective, school satisfaction would indicate a measure that reflects personal wellbeing, arising from a dynamic balance between the individual's psychological resources and the educational, pedagogical and social resources present in the school.

According to Orkibi and Ronen (2017), all the actions that the student executes to exercise volitional control over his emotions, thoughts and behaviors during the learning process, establish anchor points regarding his capacity for autonomy, making him feel competent and committed, which is transferred to his sense of belonging and general satisfaction with his school environment, strengthening his wellbeing.

Considering the background presented, the understanding of these variables linked to learning and its self-regulation contributes to the educational knowledge about the interaction of these psychological resources of students and constitutes an input to promote the design of

pedagogical strategies for effective instruction, recognizing the different needs and conditions of self-regulation, mastery and wellbeing of students within groups. (Hill & Chin, 2018). In order to meet this teaching need for knowledge of the psychological, motivational and socioemotional state of the group of students, it was considered relevant to provide three brief instruments aimed at teachers and professionals linked to the educational world, to gather information on the motivational, frustration tolerance and student school satisfaction dimensions, so that they can be instrumental supports for their pedagogical work. Being very brief and easy to score and interpret, they are expected to contribute to group understanding rather than to the individualized use of this type of results, as a result of the application of easily administered tests, which can be carried out in the classroom, in the same classroom context. The purpose pursued is, precisely, a call for a comprehensive integrative use of the information that can be reported at the class level, to deepen the knowledge of the groups; as some evidence describes, in terms of addressing the context of the assessment of non-cognitive aspects in the classroom, as a fundamental piece to broaden the contemporary perspectives of educational measurement (Leighton, 2020). This in turn promotes a formative and proactive pedagogical use of this type of analysis of the socio-affective and motivational conditions of students, which expands the repertoire of teaching tools for the creation of classroom climates conducive to better learning experiences.

METHOD

Design

The validation process involved mainly quantitative, non-experimental procedures. A first series of descriptive analyses, correlational and multiple regression analyses were performed, describing correlation coefficients, frequency measures, Cronbach's α , McDonald's ω , χ^2 , CFI, TLI, SRMR and β standardized significant in multiple linear regression models, presented as predictors of psychological wellbeing. This analysis made it possible to establish the existing associations between the three developed instruments of School Motivation (ME), Frustration Tolerance (TF) and School Satisfaction (SE) which, as described in the theoretical framework, are involved in the self-regulation of learning and refer to a predictive effect on psychological wellbeing. A second stage of structural equation analysis (SEM) was performed using confirmatory factor analysis (CFA) techniques, assuming a single-factor structure for each of the three instruments, using robust maximum likelihood estimates (MLE) (Schlomer et al., 2005), to analyze the adequacy and fit of the factorial structure corresponding to the TF, ME and SE scales and thus determine the psychometric properties of the instruments.

Participants

The students with whom the validation process was carried out are schoolchildren from the urban area of northern Chile who reside in the municipalities of Iquique and Alto Hospicio (Tarapacá Region). This selection was made by convenience, considering criteria such as geographic proximity, familiarity and knowledge of the territory by the research team and the interest of the educational institutions to participate in the study. The sample consisted of 1260 students from 7th to 12th grade (elementary and secondary education), who constituted a non-probabilistic sample,

selected by availability and voluntary participation, made up of 57.7% females, with mean age $M=14.9$ years, $DS=1.9$, belonging to three private schools with state subsidies. Feedback on the potential use of the validated instruments was given to teachers and education professionals from these schools, who were involved in working with the participating groups of students. According to the socioeconomic vulnerability index reported at the national level, these schools are located in a range between 78% and 87%, consistent with the general profile of the local territory, which sets this indicator at approximately 80% (National Board of School Aid and Scholarships [JUNAEB], 2019).

Instruments

School motivation (ME).

This scale was developed to collect student information on interest, effort and perseverance in the development of academic activities. For this purpose, a pedagogical perspective of motivation was taken into consideration, and it was consistent with a driving view of behavior towards an expected direction, facilitating school involvement and participation (Bong et al., 2023).

The instrument presents a one-factor structure, with three items that rate agreement on a scale from 1 (Strongly disagree) to 5 (Strongly agree). The items are 1) "I am quite interested in what we learn in school", 2) "I usually put a lot of effort into learning", 3) "It does not matter if it takes me time, I keep trying until I learn or get things right". The overall calculation of the scale scores indicates that the higher the score, which is obtained by averaging the scores of the three items, the higher the motivation.

Frustration Tolerance (TF).

This one-factor scale is made up of four items that inquire about the difficulty of emotional regulation in the face of general situations of frustration, and it proposes an idea of these dimensions as obstacles to academic achievement with an indirect impact on student psychological wellbeing (Salanova et al., 2010): 1) "It is difficult for me to wait my turn", 2) "If something does not work soon, I tend to get angry," 3) "When I do not get what I want, I get upset," and 4) "I get very upset when people tell me I have not done something right."

The rating of this scale uses a range of values from 1 (Strongly disagree) to 5 (Strongly agree). Before obtaining the overall score by averaging the items, they must be inverted; thus, the higher the average score of the four items, the greater the capacity to regulate frustration in adverse situations.

School Satisfaction (SE).

The single-factor scale of SE explores the students' level of liking and approval of their school and the learning activities they develop at the institutional level, taking as a reference the class and their particular learning process, from the perspective of satisfaction as a predictor of positive school adaptation (Baker & Maupin, 2009). It consists of four items: 1) "If I could choose the school I attend, I would enroll here again", 2) "I am happy with what we do at this school", 3) "I like the

classes and activities at this school" and 4) "I am satisfied with what I learn at this school". The score ranges for this scale go from 1 (Strongly Disagree) to 5 (Strongly Agree), and the four items should be averaged. The highest values obtained indicate liking and acceptance of the school space and its activities involved.

Procedure

The three instruments were designed simultaneously and purposely for the project in which this work is included, whose purpose is the monitoring of various factors associated with student psychological wellbeing in the context of engaged participation in learning activities, following the guidelines of the evidence in the specialized literature. The research team in charge of its design consisted of two researchers and a team of three professionals, with the technical support of undergraduate students, who, based on the literature review associated with the school vision of wellbeing and self-regulation in learning, constructed the items of each scale.

The three scales refer to a view of personal and contextual learning regulatory processes and have been designed in a short scale presentation mode to suit practical use in a classroom context by different types of education professionals.

For the development of this piloting and validation process, the ethical criteria and guidelines for research with human subjects approved by the respective ethics committees of the universities in which the members of the research team participate and of the state agency that provides the funds to finance the research project were followed.

The students and teachers who participated in the pilot sample signed a letter of consent acknowledging the objectives of the study, as well as rights, responsibilities and guarantees of confidentiality and physical and psychological integrity for their participation. The parents and/or legal representatives of the students also gave their authorization by signing an informed consent form.

The instruments were completed during the regular school day, with prior authorization from school authorities and planning of the process with the teachers responsible for the groups, who, together with the research team, accompanied the application process. The administration modality was digital, using computerized devices through which the modules containing the instruments were completed. The responses obtained were stored in databases hosted on the server of the university to which the principal investigator of the research team belongs, following all computer security protocols.

Data analysis

The scales underwent intermediate evaluation and systematic review processes, both quantitative and qualitative, during 2017 and 2018, from which they were refined until generating the final version presented in this study, based on the results of a pilot study conducted in 2019. One of the revision processes consisted of presenting the instruments to the teachers involved with the groups

of students who participated in the piloting process, in order to obtain their impressions and feedback, and whose contributions nurtured the refinement of the items of the scales.

The analyses of the generated databases were performed using the statistical analysis programs SPSS AMOS 22 (International Business Machines Corporation [IBM], 2013) and RStudio -integrated development environment (IDE) (Allaire, 2015).

RESULTS

Descriptive analyses and correlations between ME, TF and SE measures

Missing data on the variables of interest corresponds to 19.4%, which is in the range of acceptable common values (15% to 20%) reported in research in education and psychology (Enders, 2004). The descriptive measures of the three instruments present distributions, means and standard deviations in the expected direction according to the literature, as will be discussed below (see Table 1). The measures obtained in the three variables do not present a normal distribution (K-S Lilliefors $p < 0.05$). The moderate levels of ME and SE measured in the group of selected students tend to high values, and TF tends to moderate-high values. The correlation analyses (Spearman) between the variables are consistent with the proposed idea of linking personal and contextual factors. The values obtained indicate that, in the relationship between ME, TF and SE, the correlations are significant, with low to moderate magnitudes, showing that they are directly and positively associated (considering the inversion of negative scores on the TF scale).

Table 1.

Correlations and descriptive results of the ME, TF and SE scales.

	1	2	3	Mean	DS
1. School motivation	1			4.45	.93
2. Frustration tolerance	0.21**	1		3.69	1.25
3. Satisfaction with the School	0.46**	0.19**	1	4.04	1.18

Note. ME: School motivation; TF: Frustration tolerance; SE: Satisfaction with the School.

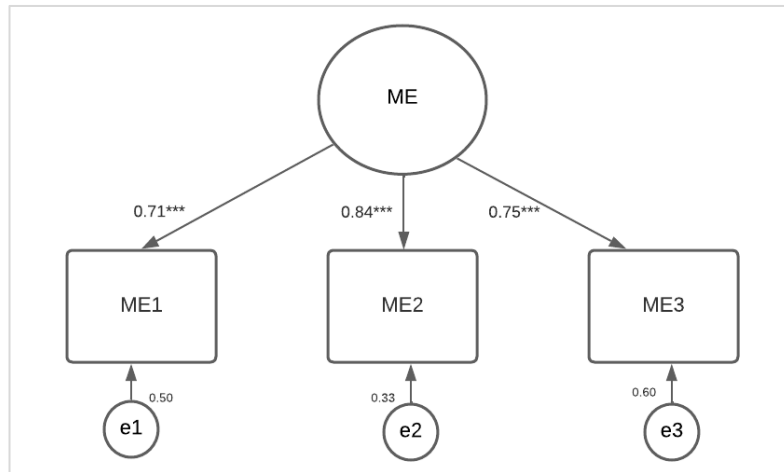
** $p < 0.01$

Confirmatory factor analysis

School motivation.

The confirmatory factor analysis for this scale shows a fit that considers a three-item unifactorial solution, with a fair identified model and indicators $\chi^2=0.00$, $gl=0$; CFI=1.0, TLI=1.0; SRMR=0.00, statistically significant factor loadings between .71, .84 and .75 (see Figure 1), with McDonald's reliability indices $\omega = .80$; Cronbach's $\alpha = .80$. The correlation between the items is moderate to high (coefficients between .52 and .62), being the highest one between items 2 and 3.

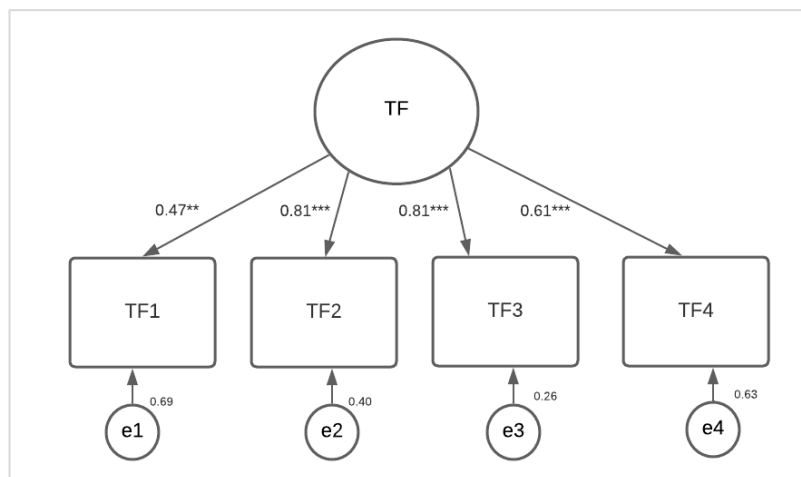
Figure 1.
Factorial model of school motivation



Frustration tolerance.

The four-item model presents a good fit with $\chi^2=26.06$, $gl=2$, $p=0.00$; $CFI=0.98$, $TLI=0.95$; $SRMR=0.002$, with significant factor loadings of .47, .81, .81 and .61 respectively (items 1 to 4) (see Figure 2), with McDonald's reliability indices $\omega= .78$; Cronbach's $\alpha= .76$. The correlation between the four items ranges from low to high, being positive and statistically significant in all associations (coefficients between .31 and .66). The highest correlation is between items 2 and 3.

Figure 2.
Factorial model of frustration tolerance

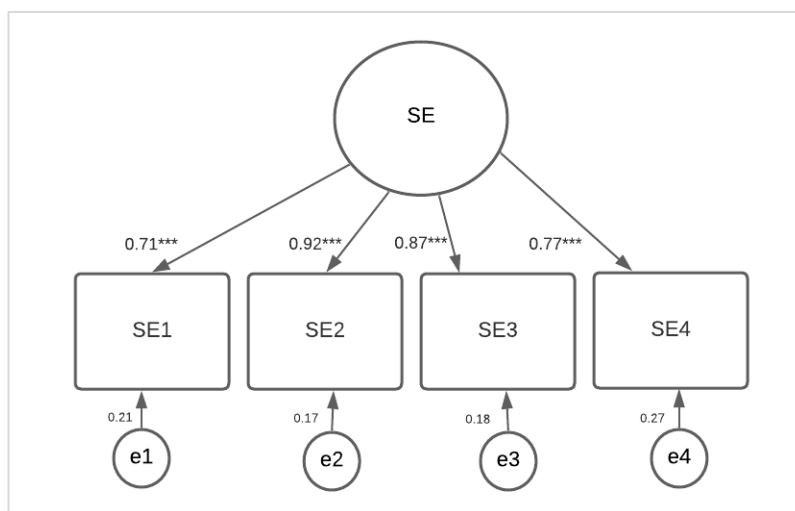


Satisfaction with school.

With a factor structure composed of four items, this model shows a good fit $\chi^2=22.288$, $gl=2$, $p=0.00$; $CFI=0.99$, $TLI=0.98$; $SRMR=0.01$, with statistically significant factor loadings of .71, .92, .87 and

.77 respectively (see Figure 3), with McDonald's reliability indices $\omega = .90$; Cronbach's $\alpha = .89$. The correlation between items is moderate to high (coefficients between .55 and .79).

Figure 3.
Factorial model of satisfaction with school



Concurrent validity of instruments to measure ME, TF and SE in relation to psychological wellbeing

Consistent with previously established theoretical descriptions, students' ME, TF, and SE conditions have a direct effect on the psychological wellbeing they experience. For this reason, the analysis procedures include, for concurrent validity purposes, a predictive measure of the values provided by the instruments in relation to psychological wellbeing, by means of a multiple linear regression model. The results show that the three measures provided by the instruments developed (ME, TF and SE) are significant predictors of student psychological wellbeing, analyzed within a model that explains 23% of the total variance of the psychological wellbeing variable (see Table 2).

The instrument used to measure psychological wellbeing is a reduced version of the original scale developed by Ryff and Keyes (1995) and validated by van Dierendonck (2004). In Chile, it was validated in the adolescent population by Gallardo and Moyano (2012). It consists of 18 items that collect scores associated with the dimensions Autonomy (items 5, 8, 12), Mastery with the environment (items 7, 10, 18), Personal development (1, 9, 15), Positive relationships (8, 14, 17), Purpose in life (4, 13, 16) and Self-acceptance (3, 6, 11). This study showed good fit indicators, consistent with those reported in previous validation processes: $\chi^2=140.414$, $gl=96$, $p=0.002$, $AIC=15355.012$, $CFI=0.96$, $TLI=0.95$, $SRMR=0.04$. The scales use a response format ranging from 1 (strongly disagree) to 6 (strongly agree). The reliabilities (Cronbach's Alpha and McDonald's Omega) of the overall combined scale presented a good level ($\alpha = .83$, $\omega = .84$).

Table 2.*Multiple linear regression of ME, TF and SE predictors on BP*

	β	DE	T	Correlation with BP
Intercept	2.33***	0.10	21.33	
ME	0.35***	0.02	11.34	0.44**
TF	0.12***	0.01	4.51	0.22**
SE	0.15*	0.02	4.96	0.33**
R=0.48	R ² =0.23	R ² adjusted=0.23		

Note. ME: School motivation; TF: Frustration tolerance; SE: Satisfaction with school; BP: Psychological wellbeing. Standardized coefficients.

*p<0.05; **p<0.01; ***p<0.001.

Qualitative feedback process with teachers

As part of the procedures for reviewing and debugging the instruments, analysis meetings were held with thirty education professionals involved in the learning activities of the courses in which piloting of the three instruments ME, TF and SE was applied, mainly teachers. In these face-to-face meetings, the objectives and preliminary results of each of the instruments were presented and discussed, prompting an analysis in groups of teachers, and the comments were then shared in a plenary session. The instrument best valued for its usefulness was the ME instrument. Teachers argued that it is an important diagnostic factor for their pedagogical objectives, since it can explain students' attitude and commitment to their studies and can be intervened through concrete classroom practices. They valued the brevity, realization, and ease of understanding of the items that make up the instrument, which is an appreciable value for them, since, from their perspective, it contributes to making the answers given by the students more reliable. They emphasized that, according to the preliminary application results, the construct seems to be very consistent with the reality they perceive within the classrooms.

As for the TF instrument, although they valued the wording aspects of the items that make it up, they mainly discussed the capacity of the construct to capture the diversity of contextual aspects that generate frustration and avoidance reactions in students, for which they focused on highlighting the attributional and emotional reaction aspect that the instrument captures, focused on negative emotions.

Finally, regarding the SE instrument, the teachers noted that, as a construct, satisfaction has an important subjective level when assessing the conditions under which students generate appreciation or rejection towards the school and its activities, so it constitutes a relevant indicator that characterizes the instrument within the subjective and interpretative margins of the students' vision of their school and their processes in it.

DISCUSSION

This study aimed to determine the psychometric characteristics and factorial structure of three short

instruments designed to measure School Motivation (SM), Frustration Tolerance (TF) and School Satisfaction (SE) associated with self-regulation of learning at school, and to detail the validation process as an instrument suitable for use in the Chilean school context.

The results derived from the analysis of data collected from students, and those obtained from the qualitative assessment carried out with teachers, support the fact that these instruments collect motivational, affective and valuation elements present in the students' school experience, from a subjective perspective, which informs about students' conditions and states, as well as their willingness to participate in learning activities within the school context.

The descriptive and correlational results are favorable and consistent with the evidence present in the literature on self-regulation of learning, which indicates the main role of motivation as the main driver of the student's directed actions, given the magnitude and significance found in the associations of motivation with the other variables under study (Pintrich, 2000; Trías, 2017). In particular, the concordance of the results obtained with evidence from previous studies that consider the perception that teachers have about the motivational conditions and academic commitment of students is highlighted, indicating moderate and high levels of motivation associated with a greater emotional reactivity to unfavorable conditions, present during the learning process and reflected in the moderate-high levels of frustration when things do not go as the student has projected (Collie et al., 2019).

Regarding the results of the confirmatory factor analyses, the factorial solutions reported are adequate in the case of the three instruments; although in the ME scale the model that evaluates it is identified in the limit, it is an instrument specified by only three items, which offers minimum conditions for the evaluation of the latent factor. For this model, the number of estimated parameters is equal to the number of unique variances and covariances among the items that make up the construct, indicating a unique and adequate factorial solution, as judged by the assessment of the total set of fit indicators (χ^2 , CFI, TLI and SRMR) (Brown, 2015). The reliabilities of the global scales are also adequate, measured through the Cronbach's Alpha and McDonald's Omega indices, indicating for the three instruments good measures of internal consistency and homogeneity as scales (Dunn et al., 2014).

Another aspect to highlight is the strength of the association of the items that make up each of the scales. In the case of the ME, the direct relationship is notable, especially between the items that refer to effort and those that are related to the persistence of the motivated behavior. For the TF scale, the strongest associations are found among the items that articulate the emotional reaction of anger and annoyance in the face of adversity.

Similarly, and in accordance with the theoretical guidelines that guided the design of the instruments and their contextualization within the school world, the predictive results of the three variables (ME, TF and SE) on psychological wellbeing provide evidence of their ability to significantly influence the last variable.

In this sense, the results suggest a positive association between the three variables as part of indicators of self-regulation in the learning process, which are tributary to psychological wellbeing.

This perspective of highlighting wellbeing as an essential part of the dynamic educational balance for students, as described above, leads to reflect on how substantial it is to sustain comprehensive and quality educational processes, to be able to recognize the affective, volitional and emotional conditions of students that would allow teachers and school directors to assess the impact of the school environment on the learning process of students (Trías, 2017).

According to Orkibi and Ronen (2017), all the actions that the student executes to exercise volitional control over his emotions, thoughts and behaviors during the learning process establish anchor points regarding his capacity for autonomy, making him feel competent and committed, which is transferred to his sense of belonging and general satisfaction with his school environment, strengthening his wellbeing.

These results are relevant, considering the variance explained (about a quarter of the total variance), in a model whose dependent variable is psychological wellbeing. It should be taken into consideration that, within the model, variables exclusively linked to self-regulation of learning were introduced, which is one of several dimensions that contribute to building an integrated idea of the self, based on egocentric and interpretive elements available to the student to adjust the psychological distance with their ideal of wellbeing (Horvath, 2018). According to the values of the estimated coefficients, in order from greater to lesser influence, and based on what the literature describes about the relationship between these variables, we obtained evidence supporting that ME is an important driver of approach-to-learning behavior (Fitzsimons & Finkel, 2010; Tardif, 1992), SE reflects a valuational synthesis of the student's feelings and closeness towards his classroom school and learning activities (Trías, 2017) and TF is an element of reactive appraisal towards situations that are adverse to him (Arguedas et al. , 2016).

The results established within the predictive model suggest that the ME is a mediating factor that connects the elements of personal bonding and reaction with the contextual syntheses that students make of their learning processes, given the intensity of these established associations with TF and SE. This is consistent with theoretical positions on motivation, which consider it as the internal regulatory axis of the students' psychological resources focused on the self-regulation of learning, which provides balance and promotes wellbeing (Bartholomew et al., 2018; Ning & Downing, 2012).

The effects of these three variables contribute to account for the contribution to the student's perception of himself as a participatory agent committed to the learning processes, and in which he can regulate and decide the conditions and strategies with which he can perform better and feel satisfied with the effort and actions carried out, which contributes to their psychological wellbeing, from an active and contextualized role in the school environment. (Orkibi & Ronen, 2017). As previously described, especially in relation to school motivation, these variables constitute a key focus within the field of teachers' pedagogical practices. When considering the interaction between these variables, which contemplate volitional aspects of effort, self-regulation, impulse and dedication, with emotional elements linked to satisfaction, it is possible to better understand, with elements from the context, the core of expectations that can justify curricular and didactic planning decisions that help to make it clearer for students the reason for their investment of energy and time in the learning process (Alonso-Tapia, 2005).

CONCLUSIONS

These three instruments constitute a set of measures that not only proved to be psychometrically valid and reliable in the Chilean school student population, but also become a practical tool offered mainly to teachers and education professionals who want to identify basic motivational, affective and satisfaction conditions in students. The feedback obtained from teachers and other education professionals in the process of designing and adjusting the instruments reflects this, as the established items are consistent with the conceptions and concerns that emerge in the classrooms during the activities associated with the learning process. These instruments can help to shed light on key aspects of these teaching conceptions and concerns. The information they provide accounts for the different conditions, needs and reactions of the students, in an environment that is, in itself, diverse, in which the information gathered through these instruments of easy and brief application can inform the teacher in a timely manner in what aspects and to what extent he can promote practices that improve the conditions of self-regulation of his students.

These elements can be collected as evidence and used to nurture educational improvement plans, indicating students' needs and potentialities that promote the design of strategies to support the management of educational facilities.

Although these instruments were designed in a Chilean context, the nature and wording of the items that make up the instruments are neutral and refer to universal circumstances and situations. For this reason, they will probably be interpreted in a similar way by students from other regions and countries, with similar cultural characteristics in Chile as well as in other countries in Latin America and other continents. Therefore, future research actions will be aimed at its evaluation in diverse school contexts in terms of geographic location.

The main limitations of this study are related to the sample characteristics. Although the validation process of these instruments has involved different instances of feedback with groups of students and teachers during various phases of piloting and return to the educational communities to discuss their results, the application of this set of instruments in broader student populations, from different administrative units (both public and private) and in different geographical contexts, would help to incorporate more evidence of their robustness, facilitating the analysis of invariance between groups, according to their geographical and cultural origin.

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