Intellectual and Developmental Disabilities

Preliminary Reliability and Validity of the Self-Determination Inventory: Student Report French Translation
--Manuscript Draft--

Title: Preliminary Reliability and Validity of the Self-Determination Inventory: Student

Report French Translation

Running Title: SDI:SR FRENCH

Abstract

There is a strong and growing focus on self-determination in French-speaking countries, and this pilot study reports the technical adequacy of the Self-Determination Inventory: Student Report (SDI:SR) French Translation. Data were collected with 471 French-speaking youth with and without disabilities in Canada (Quebec), Switzerland, France, and Belgium. Key findings showed it was feasible to use 20 (of 21) items to represent the self-determination construct in the French-speaking sample. The same set of items function in the same way across students with and without disabilities and students with disabilities descriptively scored lower. Overall, this study provides promising evidence for reliability and validity of the SDI:SR French Translation and suggests ongoing development and larger-scale testing of the SDI:SR French Translation is warranted.

Keywords: Self-determination, Self-Determination Inventory: Student Report, youth with and without disabilities, French-speaking countries

Self-determination has received attention throughout the world given research

establishing a relationship between self-determination and valued outcomes, including

employment, community participation and quality of life (Lachapelle et al., 2005; Shogren,

Wehmeyer, Palmer, Rifenbark, et al., 2015). For example, the United Nations Convention on the

Rights of Persons with Disabilities (CRPD; United Nations, 2006) emphasizes the importance of

self-determination across life domains. Consequently, there is a growing focus on promoting

self-determination across the life course through effective assessment, intervention, and supports

(Wehmeyer & Shogren, 2017). A wide body of research has focused on the importance of

assessing and intervening to promote self-determination during the transition from school to

adult life for people with disabilities (Shogren & Ward, 2018). Although much of the early work

was conducted in the United States work throughout the world, including in French-speaking

countries, has established the importance of supporting self-determination for adolescents with

and without disabilities in inclusive settings (Haelewyck et al., 2005; Lachapelle & Lussier-

Desrochers, 2009; Lachapelle et al., 2017; Piazza, 2020; Shogren et al., 2016).

Causal Agency Theory

Critical to efforts to promote self-determination and reduce disparities across students

with and without disabilities is ensuring that there are valid and reliable assessments that can be

used to document self-determination outcomes. The *Self-Determination Inventory: Student

Report* (SDI:SR; Shogren et al., 2017) was developed to meet the need for a self-report measure

of self-determination validated with adolescents with and without disabilities (Shogren et al.,

2020). The SDI:SR was developed to align with Causal Agency Theory (Shogren, Wehmeyer,

Palmer, Forber-Pratt, et al., 2015). Causal Agency Theory integrates past theoretical work and

research on the development of self-determination in the fields of education and psychology and

defines self-determination as a "dispositional characteristic manifested as acting as the causal

agent in one's life" (Shogren, Wehmeyer, Palmer, Forber-Pratt, et al., 2015, p. 258). Causal

Agency Theory identifies three essential characteristics of self-determined actions. *Volitional*

action refers to the extent to which a person makes intentional, conscious choices based on

preferences and self-initiates goal setting using past experiences as a guide. *Agentic action*

involves self-directing and managing actions towards a freely chosen goal, including identifying

different pathways to navigate around barriers encountered when pursuing goals. Finally, *action-*

control beliefs relate to recognizing one's own strengths and needs related to goal pursuits and

feeling empowered to engage in goal-directed actions.

Global Interests in Self-Determination

Researchers across cultures have consistently asserted that there are universal elements of

the self-determination construct, although they have also acknowledged that self-determined

actions may be expressed differently across cultures (Lachapelle et al., 2004, 2010; Shogren,

2011). The SDI:SR was developed in American English, and Shogren and colleagues (2020)

provided evidence for its unidimensional internal structure and measurement invariance across

disability groups with 2,338 adolescents with and 2,352 without disabilities in the United States.

However, they found that disability status impacted scores, with students with disabilities scoring

lower than their peers without disabilities although there were interactions with other factors,

including race/ethnicity and socioeconomic status (Shogren, Shaw, et al., 2018a). Validation

studies of the SDI:SR Spanish Translation have also been conducted with Spanish youth

(Mumbardó-Adam et al., 2017) with similar evidence for the unidimensional structure of the

SDI:SR Spanish and partial measurement invariance across the SDI:SR and SDI:SR Spanish

(Shogren et al., 2019). However, ongoing examinations of the cross-cultural validity of the self-

determination construct are needed, and the purpose of the current study was to investigate whether the SDI:SR can be used with French-speaking youth by examining several sources of validity and reliability evidence for the SDI:SR French Translation.

Self-Determination in French-Speaking Countries

In French-speaking countries, there has been a surge of interest in self-determination since the late 1990s. Self-determination was introduced in Quebec with the publication of the French adaptation of a self-determination and transition curriculum, *Whose Future is it Anyway* (Wehmeyer & Kelchner, 1995) and an article presenting the functional model of self-determination (Lachapelle & Boisvert, 1999). Subsequent work has included the translation and preliminary validation of an early assessment of self-determination (Wehmeyer et al., 2001) and international collaborations with francophone researchers from Quebec, Belgium, France, and Switzerland. Multiple papers have been published introducing the concept of self-determination across French-speaking countries (Haelewyck et al., 2005; Lachapelle et al., 2004) and documenting efforts focused on enhancing self-determination in school settings (Fontana-Lana & Petitpierre, 2017) and in adult services and supports (Lachapelle et al., 2013).

In sum, the SDI:SR French Translation is intended to measure levels of self-determination of French-speaking youth with and without disabilities. Scores are proposed to be used in the following ways: (1) in cross-sectional research to examine individual differences in self-determination, including research to compare levels of self-determination across language and disability groups, (2) in experimental research to assess the impact of interventions and supports that aim to enhance self-determination, (3) in longitudinal research to track changes in self-determination over time, and (4) in school and community contexts to document the outcomes of supporting people with and without disabilities in developing self-determination.

Study Purpose

Given the focus on self-determination in French-speaking countries and emerging work focused on validating the SDI:SR across cultures, the author team translated the SDI:SR into French and examined several sources of reliability and validity evidence for the SDI:SR French Translation, as described next. According to the Standards for Educational and Psychological Testing (AERA et al., 2014), validity is "the degree to which evidence and theory support the interpretations of test scores for proposed uses of tests" (p. 11). The argument-based approach to validation (Kane, 2013, 2015; see also AERA et al., 2014) constitutes a framework for justifying proposed interpretations and uses of the instrument scores via specifying claims and evaluating them through an examination of evidence. In the present analyses, we focused on examining five claims that focus on the technical quality of the SDI:SR French Translation (see Table 1). We view these claims as essential but not necessarily sufficient for the proposed interpretations and uses. Table 1 links our claims to research questions.

Method

Participants

French-speaking adolescents (n = 471) from Canada (Quebec), Switzerland, France, and Belgium were recruited to participate in the study. Slightly more than half of the sample (51%) did not have an identified disability. Of those that had identified disabilities, the largest category was students with "mild" learning disability (44% of the disability sample), followed by "mild" intellectual disability (32%), and attention deficit / hyperactivity disorder (29%). A total of 116 adolescents in the sample who had identified disabilities had more than one disability label (51% of the disability sample). The average age of participants was 16.33 (SD = 1.72), ranging from 10 to 22. Approximately 47% of the overall sample reported being female, and the percent of

female students was greater in the no disability sample than in the disability sample. The largest proportion of students without disabilities were from Switzerland (74%), whereas students with disabilities were evenly distributed across the four countries. Additional demographic information for students with and without disabilities is provided in Table 2.

Self-Determination Inventory: Student Report and French Translation

The SDI:SR is a self-report measure that contains 21 items that align with Causal Agency Theory (Shogren, Wehmeyer, Palmer, Forber-Pratt, et al., 2015). The SDI:SR is administered online and responses to each item are indicated on a slider scale that is scored by the computer from 0 to 99 (disagree to agree) (Shogren et al., 2020). The 21 items included in the SDI:SR were translated from English to French following a rigorous protocol for international translations set forth by the developers of the SDI:SR (Kansas University Center on Developmental Disabilities, 2019). Specifically, the French speaking members of the research team followed a seven-step process, using two committees of experts in self-determination with experience translating education materials. The first step was to have two bilingual content experts individually translate the SDI:SR into French. They then met and compared their translations and came to consensus on a preliminary translation. That version was submitted to six international experts from France, Belgium, and Switzerland. This committee reviewed the translation and made suggestions for revisions. Next, a virtual meeting was held to discuss and make final adjustments, leading to a preliminary version. Also, because of the complexity of terms across the multiple French-speaking countries, a list of alternative vocabulary for several words was developed to share with people administering the instrument. Feedback from end-users (i.e., students with and without disabilities) was collected in each country to verify clarity and appropriateness of the test instructions, item stems, scoring scale, and survey presentation

prior to collecting data for the present study. This information was integrated into the pilot study version of the scale that was used in this study, as well as the instructions for administrators.

Although the SDI:SR is delivered online, initial data collection occurred outside of the custom SDI:SR delivery platform, using a pilot paper-and-pencil version, because of the costs of programming the online system. Specific protocols for using a paper-and-pencil version aligned with the online version were adopted. Students marked their agreement on a continuous line, using the anchors of "En désaccord" (i.e., Disagree) and "En accord" (i.e., Agree). Twenty-one ticks were placed on the line, with larger ticks every five points. The location on the line was scored by the author team using a visual overlay, between 0 and 20. Please contact the authors for more information on accessing the SDI:SR French.

Procedures

This study was approved by the lead university's ethics board, whose approval was recognized by the collaborating universities in countries where data was collected. In the four countries (Switzerland, Canada – Quebec, France, and Belgium), students with and without disabilities were recruited from both regular and specialized school environments. In order to recruit participants, each countries lead contact contacts one (or more if necessary) education settings to explain the project and solicit their participation. For schools that agreed to participated, a contact person was identified that linked the researchers to teachers. Teachers then identified eligible students based on criteria provided by the researchers, and consents forms were distributed to students to share with families. Students that returned consent forms then completed the Self-Determination Inventory. Inclusion criteria included being in full-time secondary schooling and having a basic level of proficiency in the French language (comprehension and/or reading). Researchers from each country focused on recruiting a diverse

sample in terms of gender, age, types and levels of education, and presence of disability. In total, 471 youth were recruited (Switzerland n=252, Quebec n=98, France n=69, and Belgium n=52).

Data Analysis

The dataset and the analysis scripts are available on the project's Open Science Foundation (OSF) page: https://osf.io/py5nj/?view_only=51fc7d0d50a6493fa449aa06c744fa89.

Missing data

The amount of missing data on items was minimal; 457 participants (97.03%) did not have missing data. Therefore, for the analysis that involved latent variables (Research Questions 2, 3, and 4), a full information maximum likelihood approach was used to handle missing data. For the calculation of Cronbach's alpha in Research Question 5, listwise deletion was used.

Research Question 1

We investigated the following response characteristics of the items in the SDI:SR French Translation using SAS, version 9.4. *(SAS/STAT 14.1 User's Guide, SAS/STAT 14.1 User's Guide., 2015)*: descriptive statistics (means, standard deviations, skewness, and kurtosis), frequencies, and correlations. We expected distributions of item scores to be approximately normal. Further, items should have moderate-to-high correlations if they were to indicate a common factor and have good reliability (Bollen & Lennox, 1991).

Research Question 2

To determine the internal structure of the SDI:SR French, we used confirmatory factor analysis (CFA). Our specification of competing CFA models was informed by the original design of the SDI:SR and prior validation research (Raley et al., 2019). Causal Agency Theory suggests a three-factor structure where items are grouped by the three essential characteristics and load on one higher-order general self-determination construct (Shogren, Wehmeyer, Palmer,

Forber-Pratt, et al., 2015). Prior research tested a three-factor structure but accepted a

unidimensional structure due to very high correlations between factors (Raley et al., 2019). Thus,

we tested a three-factor model as well as a unidimensional model.

For estimation, we used robust maximum likelihood (MLR) as it produces standard errors

and a Chi Square test statistic that are robust to non-normality. To evaluate global model fit, we

examined the Satorra-Bentler Scaled Chi-Square test of exact fit, the Root Mean Square Error of

Approximation (RMSEA) with a 90% confidence interval, the Standardized Root Mean Square

Residual (SRMR), the Bentler Comparative Fit Index (CFI), and the Tucker Lewis Index (TLI).

A statistically non-significant Chi Square suggests excellent model fit. RMSEA less than 0.06,

SRMR less than 0.08, and CFI and TLI above 0.95 suggest good model fit (Hu & Bentler, 1999).

Indicators of global model fit do not allow for identifying the size and location of misfit.

However, knowing and addressing sources of severe local misfit (e.g., omitted error correlations)

is critical because their presence may result in distorted parameter estimates (Bocell, 2015). To

achieve this goal, we examined modification indices. To determine if local misfit was

substantial enough to produce distorted parameter estimates, we conducted a sensitivity check

(Byrne et al., 1989). Specifically, we estimated multiple error correlations (adding them one at a

time) that corresponded to the largest modification indices until we find a model with a

statistically non-significant Chi Square. We compared the loadings between this model and the

original model. If the differences were deemed to be small, local misfit was considered small and

unlikely to affect model interpretation. However, if the differences were large, we planned to

address the source of misfit before proceeding with model interpretation.

To compare fit of the tested models, we employed the Chi Square difference testing,

appropriate for the MLR estimator (*Mplus*, n.d.). We also evaluated standardized factor loadings.

Conventionally, standardized factor loadings can be viewed as salient if they are higher than at least 0.3 (Brown, 2015). Thus, we considered items with standardized factor loadings lower than 0.3 for removal. CFA analyses were conducted in Mplus, version 8.4 (Muthén &Muthén, 2019).

Research Question 3

After establishing the best model for Research Question 2, we tested for measurement invariance of the SDI:SR French Translation across students with and without disabilities. Specifically, we conducted a series of multi-group CFA analyses to successively test for configural, metric, and scalar invariance (Vandenberg & Lance, 2000). Configural invariance suggests that the internal structure of the instrument applies to both groups. Metric invariance suggests that the construct is manifested in the same way across the two groups. Finally, scalar invariance suggests that both groups use the response scale in the same way. Students without disabilities were used as a reference group. If metric or scalar invariance do not hold, one option is to consider establishing partial invariance where non-invariant loadings and/or intercepts (i.e., those that had statistically significant modification indices, $p < .05$) are freely estimated in each group (adding one relaxed constraint at a time). Another option is to implement the alignment method that produces results of invariance testing across groups for each loading and intercept by identifying the most optimal pattern of measurement invariance (Asparouhov & Muthén, 2014). Finally, to evaluate the fit of each model, compare the fit of different models, and conduct a sensitivity check (if needed), we used the same procedures as for Research Question 2.

Research Question 4

To investigate whether there were latent mean and variance differences in self-determination across students with and without disabilities, we tested for structural invariance (Vandenberg & Lance, 2000). Conventionally, for the structural invariance testing, at least

partial measurement invariance is required (Byrne et al., 1989). However, for latent mean

difference testing, more recent research recommended the alignment method (Marsh et al.,

2018), which allows for estimation of group means and variances in the absence of full scalar

invariance. Hence, we also used the alignment method to check for sensitivity of the results of

the mean difference testing. To evaluate the fit of each model and compare the fit of different

models that were based on the scalar (or partial) measurement invariance model, we used the

same procedure as for Research Question 2. For the alignment method, the information about the

significance of the mean difference was reported in the Mplus output.

Research Question 5

To determine the internal consistency, we computed Cronbach's alpha. We provide

Cronbach's alpha in this paper because it is commonly used and well understood in the field. To

indicate good internal consistency, Cronbach's alpha should be greater than 0.70 (Nunnally &

Bernstein, 1994). Cronbach's alpha was computed in SAS, version 9.4.

Results

Research Question 1: Item-level Descriptive Statistics

An examination of item-level descriptive statistics (available on the OSF Page) showed

that all items were negatively skewed. Yet, the skewness was not extreme. The maximum

skewness was -1.43 for Q8 ("I think trying hard helps me get what I want"). Kurtosis values

suggested that some items also had sharp peaks, with the largest kurtosis being 2.32 for Q8.

Examining the differences between students with and without disabilities, we found that items

had similar means. The largest difference was observed for Q7 ("I set my own goals") where

students with disabilities, on average, scored 1.91 lower than students without disabilities.

Further, item score distributions tended to have larger variances for students with disabilities.

Next, the items across the two groups were similar in skewness, although the items for students

with disabilities tended to be more negatively skewed. Finally, the items across the two groups

tended to also be similar in kurtosis with a few notable exceptions. Specifically, Q4 ("I know

what I do best") and Q9 ("I choose activities I want to do") had sharper peaks for students with

disabilities, whereas Q7 ("I set my own goals") had a sharper peak for students without

disabilities.

An examination of frequencies revealed that some students appeared to prefer to respond

to items in the increments of five (see Figure 1 for an example item distribution). Specifically, on

average, 44.54% of items per student (SD = 24.59) were answered with 0, 5, 10, 15, or 20. This

finding was observed across students with and without disabilities (mean = 44.58%, SD = 27.44

and mean = 44.58%, SD = 21.63, respectively). To explore the issue from a different perspective,

we also computed the frequencies of responding in the increments of five by item rather than by

person. Results show that items, on average, were answered in the increments of five by 44.55%

of students (SD = 3.33), ranging from 40.60% for Q1 ("I have what it takes to reach my goals")

to 54.89% for Q18 ("I choose what my room looks like").

An examination of item correlations showed that, on average, inter-item correlations

were 0.265 (SD = 0.095), ranging from 0.075 to 0.553. Considering the possibility for the three-

factor structure, on average, inter-item correlations within the hypothesized factors were 0.288

(SD = 0.096), ranging from 0.081 to 0.520. For items designed to indicate common factors, such

correlations may be viewed as low. Across students with and without disabilities, patterns of

correlations between items were comparable (mean = 0.275, SD = 0.100 and mean = 0.257, SD =

0.118, respectively), although some differences were observed. The largest difference occurred

for the correlation between Q10 ("I work hard to reach my goals") and Q12 ("I am confident in

my abilities"), where the correlation was 0.39 (p < 0.0001) for students with disabilities and 0.04 (p > 0.05) for students without disabilities.

Overall, the analysis of item characteristics showed several patterns of note. First, items showed some deviations from normality. Second, response options in increments of five may have been preferred by some students. Third, correlations of items, designed to indicate a common factor, tended to be lower than desired. Fourth, while item characteristics were comparable across students with and without disabilities, notable differences were observed. Yet, none of these findings are so extreme as to suggest low item quality or a lack of justification for moving forward with additional analyses. Thus, the results for Research Question 1 provided some evidence for the claim that observed characteristics of item scores on the SDI:SR French Translation are as expected.

Research Question 2: Confirmatory Factor Analysis

The three-factor model resulted in the not positive definite latent variable covariance matrix. Factor correlations were close to one, ranging from 0.861 to 0.995. Thus, the three-factor structure was rejected. For the unidimensional model, indicators of global fit were as follows: Chi Square (189) = 458.22, p < 0.0001, RMSEA = 0.055, 90%CI [0.049, 0.061], SRMR = 0.054, CFI = 0.845, and TLI = 0.827. RMSEA and SRMR were within the acceptable range. However, the Chi Square test was statistically significant, and CFI and TLI were outside of the acceptable range. An examination of modification indices did not reveal extreme values that were substantially higher than other values. The maximum value was 24.53, which corresponded to the expected error correlation of 0.291 between Q6 ("I keep trying even after I get something wrong") and Q8 ("I think trying hard helps me get what I want"). To examine whether modification indices were substantial enough to distort standardized loadings, we conducted a

sensitivity check. Specifically, we found a well-fitting model with 21 error correlations, Chi

Square (168) = 193.39, p = 0.087. Comparing standardized loadings between the models with

and without error correlations, we found that the differences were very small and do not make a

substantive difference in model interpretation. On average, the absolute values of differences in

standardized loadings between the models were 0.019 (SD = 0.013), with the maximum

difference of 0.053. Thus, there was small, although non-negligible, misfit in multiple parts of

the model, the addition of which resulted in poor indicators of global fit. However, the model did

not have misfit substantial enough to distort standardized loadings, suggesting that the model had

acceptable fit for present purposes. Standardized loadings in this model, on average, were 0.515

(SD = 0.112), ranging from 0.284 (for Q18 "I choose what my room looks like") to 0.722 (for

Q21 "I come up with ways to reach my goals"). All standardized loadings were statistically

significant. However, Q18 had a standardized loading below the recommended threshold. This

information in combination with findings from other translated versions of the SDI:SR and this

item being more directly linked to a specific context (i.e., a young person's room) than other

items led to the item removal and re-fitting of the unidimensional model.

For the 20-item model, indicators of global fit were similar to those for the 21-item

model: Chi Square (170) = 417.29, p < 0.0001, RMSEA = 0.056, 90%CI [0.049, 0.062], SRMR

= 0.053, CFI = 0.852, and TLI = 0.834. An examination of modification indices again did not

reveal extreme values that were substantially higher than other values. Similar to the model with

21 items, the maximum value was 24.27, which corresponded to the expected error correlation of

0.291 between Q6 and Q8. All standardized loadings were above the recommended threshold

(see Table 3), with the lowest value being 0.334 for Q5 ("I plan weekend activities I like to do").

Thus, we tentatively accepted the 20-item structure as the internal structure of the SDI:SR

French Translation.

   Overall, with the CFA analyses, we tentatively concluded that the instrument has a unidimensional internal structure. However, the fit of the final 20-item model was not excellent; the ignored misfit was small but non-negligible. Further, some standardized loadings were also on the lower boundary of acceptable. Thus, the results for Research Question 2 provided preliminary evidence for the claim that SDI:SR French has an established internal structure.

Research Question 3: Measurement Invariance

   Results of the measurement invariance testing are presented in Table 4. The configural invariance model with 20 items showed poor fit according to Chi Square, RMSEA, CFI, TLI, and acceptable fit according to SRMR. However, an examination of modification indices did not reveal extreme values that were substantially higher than other values. The maximum value was 31.65 for students without disabilities, which corresponded to the expected error correlation of 0.428 between Q6 ("I keep trying even after I get something wrong") and Q10 ("I work hard to reach my goals"). To examine whether modification indices were substantial enough to distort standardized loadings, we conducted a sensitivity check. Specifically, we found a well-fitting model with 18 error correlations in the no disability group and 21 error correlations in the disability group, Chi Square (301) = 339.29, p = 0.064. Comparing standardized loadings between the models with and without error correlations, we found that the differences were very small and do not make a substantive difference in model interpretation. On average, the absolute values of differences in standardized loadings between the models were 0.022 (SD = 0.019), with the maximum difference of 0.077. Thus, there was non-negligible misfit in multiple parts of the model, the addition of which resulted in fairly poor indicators of global fit. Yet, the misfit was not substantial enough to distort standardized loadings, suggesting that the model had acceptable

fit. Given the acceptable fit, we tentatively retained the configural invariance model and proceeded to the next step.

The fit of the metric invariance model was not significantly worse than the fit of the configural invariance model, according to the statistically non-significant Chi Square difference test. Thus, the metric invariance model was retained. The fit of the scalar invariance model was significantly worse than the fit of the metric invariance model, according to the statistically significant Chi Square difference test. Modification indices suggested that there were four non-invariant intercepts: for Q7 ("I set my own goals"), Q10 ("I work hard to reach my goals"), Q14 ("I think about each of my goals"), and Q20 ("I know my strengths"). Specifically, the intercept for Q7 was higher for students without disabilities, and the intercepts for Q10, Q14, and Q20 were higher for students with disabilities. However, values revealed by modification indices were not extreme or substantially higher than other values. The maximum modification index was 13.63 (Q7), which corresponded to an expected standardized increase of 0.119 for students without disabilities and an expected standardized decrease of 0.205 for students with disabilities. Thus, the differences between intercepts for these four items were fairly small, although non-negligible. Further, the alignment method suggested only two intercepts to be non-invariant: for Q10 and Q14. Therefore, we tentatively retained scalar invariance. Yet, we also tested models where equality constraints on the four intercepts (Q7, Q10, Q14, and Q20) were relaxed one at a time. The procedure resulted in a partial scalar invariance model, the fit of which was not statistically significantly different from the fit of the metric invariance model. The partial-scalar model was retained for the purposes of a sensitivity check in Research Question 2.

Overall, with a series of multi-group CFA analyses, we tentatively concluded that measurement invariance was a tenable assumption. However, the fit of the scalar model was not

excellent, as the ignored non-zero error correlations and differences in some intercepts were small but non-negligible. The results for Research Question 3 provided some evidence for the claim that SDI:SR French functions in the same way for students with and without disabilities.

Research Question 4: Structural Invariance

Results of the structural invariance testing are presented in Table 4. When means were constrained to be equal across groups in the scalar invariance model, the fit was not significantly worse than the fit of the scalar invariance model, ΔChi Square (1) = 3.759, p = 0.053, suggesting that students with disabilities did not score significantly differently than students without disabilities. The mean of the disability group in the scalar model was -0.209 (SE = 0.119), p = 0.079. However, when means were constrained to be equal across groups in the partial scalar invariance model, the fit was significantly worse than the fit of the partial scalar invariance model, ΔChi Square (1) = 6.803, p = 0.009. The mean of the disability group in the partial scalar model was -0.268 (SE = 0.118), p = 0.023, suggesting that students with disabilities scored lower than students without disabilities. Finally, when the alignment method was used, the mean difference was not found to be statistically significant; the mean of the disability group was -0.281 (SE = 0.145), p = 0.053. Yet, all these mean estimates are similar. Thus, considering the lack of stability in statistical significance, we conclude more research is needed to further understand mean differences between students with and without disabilities in French-speaking students. Next, when variances were constrained to be equal across groups in the scalar invariance model, the fit was significantly worse than the fit of the scalar model, ΔChi Square (1) = 13.548, p < 0.001. Whereas variance for students without disabilities was fixed to one, variance for students with disabilities in the scalar model was 1.702 (SE = 0.252), p < 0.001. Similar results for variance of the disability group were found when the alignment method was

used and when variances were constrained to be equal across groups in the partial-scalar invariance model.

Overall, with the multi-group CFA analyses, we found that latent means for students with and without disabilities were similar, with students with disabilities slightly lower. However, variance was larger for students with disabilities. Thus, the results for Research Question 2 provided evidence for the part of the claim about scores on the SDI:SR French Translation having larger variance for students with disabilities than for students without disabilities. However, we did not provide strong evidence for the part of the claim about scores on the SDI:SR French Translation being lower for students with disabilities than for students without.

Research Question 5: Internal Consistency

Cronbach's alpha of the 20-item SDI:SR French were 0.878 (based on N = 458), suggesting that item scores have good internal consistency. The results for Research Question 5 provided evidence for the claim that scores on the SDI:SR French are internally consistent.

<div align="center">**Discussion**</div>

Given the focus on supporting the development and expression of self-determination in youth and young adults with and without intellectual and developmental disabilities throughout the world, there is a need for validated measures of self-determination across cultural contexts, including French-speaking countries. The purpose of this paper was to report on the preliminary reliability and validity evidence for the SDI:SR French Translation, informing ongoing research and practice to (a) further develop the SDI:SR French Translation and (b) evaluate validity evidence for technical quality of the instrument in French-speaking countries. The findings provide promising evidence for the examined claims about the reliability and validity of the SDI:SR French Translation (see Table 1) and suggest that ongoing development and larger-scale

testing of the SDI:SR French Translation is warranted.

Limitations and Implications for Future Research and Practice

In interpreting the findings and providing direction for future research and practice, it is important to consider several overall findings. First, consistent with research with the original SDI:SR (Shogren et al., 2020) and SDI:SR Spanish Translation (Shogren et al., 2019), a single factor model best fit the SDI:SR French Translation data. This is consistent with Causal Agency Theory, which holds that an overall self-determination construct can be measured and can provide meaningful information about young people's current levels of self-determination. However, one item (Q18 "I choose what my room looks like") included in the SDI:SR demonstrated issues in the French sample. Work since the publication of the SDI:SR has also suggested that there may be issues with this item, including perhaps theoretical misalignment across the lifespan (Shogren, et al., 2021). As such, this item was dropped from the analysis of the SDI:SR French, and ongoing cross-cultural work on the most appropriate items across cultural contexts will be needed. For example, cognitive interviews with French-speaking youth may be useful to determine response processes that influenced engagement with this or other items. As the unidimensional internal structure was considered tentative at this point, additional work, with larger samples of French-speaking youth, should continue to explore the internal structure of the scale, as well as determine if additional modifications are needed.

Next, we conducted measurement invariance testing and tentatively concluded that the same set of items could be used in the same ways across students with and without disabilities. This finding, which is consistent with work in the U.S. and Spain (Shogren et al., 2020; Shogren et al., 2019), suggests the potential utility of the SDI:SR and Causal Agency Theory in school contexts and warrants future validation research for using the assessment to support all students

with and without disabilities in French-speaking contexts. When examining latent mean

differences between students with and without disabilities, however, we were not able to draw

clear conclusions. While previous work has suggested that students with disabilities tend to score

lower than their peers with disabilities (Shogren, Shaw, et al., 2018a), in the French-speaking

sample, we found that although the difference was in the expected direction, it was small and

could have been observed by chance. More work is needed to examine this finding with larger

samples and determine if consistent differences are detected.

There are also additional issues that should be explored, particularly in transitioning from

the paper-and-pencil version of the SDI:SR French Translation to online administration that

embeds features of universal design to promote accessibility. For example, in the present sample,

there were multimodal distributions of item scores. This may have emerged from a seeming

preference by participants to respond in the increments of five (also referred to as rounding; see

Figure 1). Such a preference could have resulted from the visual appearance of the scale, as the

paper-and-pencil version had larger ticks at 5-point increments to facilitate scoring (see the

project's OSF page). Prior research on the SDI:SR found similar issues with the paper-and-pencil

version used in initial testing (Raley et al., 2019), and methodological research suggests that

visual appearance of visual analog scales influences the response distribution (Matejka et al.,

2016). Ongoing work is needed to determine the best way to present response scales in different

formats, particularly for students with intellectual and developmental disabilities and across

cultural contexts.

For all proposed uses, there is a need for stronger evidence of internal structure and

measurement invariance across students with and without disabilities, using a larger sample that

is representative across French-speaking countries and disability groups. Further, evidence of

response processes will be beneficial to ensure that items are interpreted as intended and response scales are used also as intended. Additionally, the current study provided evidence for the use of the scale scores in the form of latent variables. If observed composite scores were to be used, future validation research should also validate the scoring rules. To support the use of the SDI:SR French in research that aims to assess intervention effects on self-determination, it will also be important to show that the assessment can detect the effect of interventions that have been shown to be successful in prior research in French-speaking contexts. To support the longitudinal use, evidence for longitudinal measurement invariance will also be necessary. Finally, for the use of the assessment in school and community contexts to support people in developing self-determination, consequential validity requires ongoing attention particularly in French-speaking countries.

Conclusion

Overall, the findings of this study are promising and warrant ongoing and expanding testing of the SDI:SR French Translation, moving beyond pilot testing and exploring online administration to further examine evidence for the claims evaluated in this study as well as ongoing, necessary research to support the proposed uses of the assessment for young people with intellectual and developmental disabilities.

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Table 1

Validation Plan

Claim / RQ #	Claim	Research Question	Methods
1	Observed characteristics of item scores on the SDI:SR French Translation are consistent with expected characteristics.	What are characteristics of item scores in the SDI:SR French Translation?	Descriptive statistics, frequencies, bivariate correlations
2	The SDI:SR French Translation has an established internal structure.	What is the internal structure of the SDI:SR French Translation?	A series of CFAs
3	The SDI:SR French Translation functions in the same way for students with and without disabilities.	Is measurement invariance of the SDI:SR French Translation supported for students with and without disabilities?	A series of multi-group CFAs
4	Scores on the SDI:SR French Translation are lower and have larger variance for students with disabilities than for students without disabilities.	Are there latent mean and variance differences in the levels of self-determination, as measured by the SDI:SR French Translation, between students with and without disabilities?	A series of multi-group CFAs
5	Scores on the SDI:SR French Translation are internally consistent.	What is the internal consistency of scores on the SDI:SR French Translation?	Cronbach's alpha

Table 2

Demographics of the Sample

Characteristic	Total (N = 471)		With Disability (N = 229)		Without Disability (N = 241)	
	n	%	n	%	n	%
Disability Status						
No disability	241	51.17				
Disability	229	48.62				
Disability status unknown	1	0.21				
Disability Label *						
Mild learning disability			101	44.10		
Severe learning disability			20	8.73		
Behavior disorder			49	21.40		
Severe behavior disorder			7	3.06		
Mild intellectual disability			73	31.88		
Mild motor impairment			10	4.37		
Visual impairment			18	7.86		
Hearing impairment			6	2.62		
Autism Spectrum Disorder (ASD)			27	11.79		
Attention deficit / hyperactivity disorder			67	29.26		
Other			32	13.97		
Disability not specified			4	1.75		
Gender						
Male	248	52.65	133	58.08	115	47.72
Female	219	46.50	94	41.05	124	51.45
Not specified	4	0.85	2	0.87	2	0.83
Country						
Canada, Quebec	98	20.81	48	20.96	50	20.75
Switzerland	252	53.50	73	31.88	178	73.86
France	69	14.65	62	27.07	7	2.90
Belgium	52	11.04	46	20.09	6	2.49
Nationality						

Characteristic	Total (N = 471)		With Disability (N = 229)		Without Disability (N = 241)	
	n	%	n	%	n	%
Canadian	92	19.53	44	19.21	48	19.92
Swiss	165	35.03	47	20.52	118	48.96
French	5	1.06	5	2.18	0	0
Belgian	47	9.98	41	17.90	6	2.49
Other	93	19.75	30	13.10	62	25.73
Not specified **	69	14.65	62	27.07	7	2.90
Language Spoken at Home						
French	298	63.27	154	67.25	144	59.75
Bilingual including French	163	34.61	73	31.88	89	36.93
Trilingual including French	10	2.12	2	0.87	8	3.32
Level of support that a participant gets at school to manage their learning						
No additional support	239	50.74	52	22.71	187	77.59
A little support	49	10.40	30	13.10	18	7.47
Support several days a week	4	0.85	3	1.31	1	0.41
Support every day for a few hours	4	0.85	3	1.31	1	0.41
Support every day throughout the day	61	12.95	56	24.45	5	2.07
"I don't know" or No answer or Several answers checked	45	9.55	23	10.04	22	9.13
Not specified **	69	14.65	62	27.07	7	2.90

Note. * The total does not equal to 229 (or 100%) because students may have more than one disability.

** Data are missing for participants from France.

Table 3

Standardized Factor Loadings of the Final Model

Item	Standardized loading	
	Estimate*	SE
Q1	0.569	0.040
Q2	0.482	0.043
Q3	0.409	0.048
Q4	0.469	0.047
Q5	0.334	0.049
Q6	0.559	0.045
Q7	0.560	0.044
Q8	0.449	0.048
Q9	0.380	0.047
Q10	0.470	0.046
Q11	0.651	0.042
Q12	0.624	0.036
Q13	0.551	0.041
Q14	0.542	0.044
Q15	0.635	0.040
Q16	0.385	0.046
Q17	0.556	0.044
Q19	0.555	0.040
Q20	0.622	0.037
Q21	0.723	0.033

Note. * All factor loadings are statistically significant ($p < 0.001$). SE = Standard Error.

Table 4

Measurement and Structural Invariance Testing

Model	Satorra-Bentler Scaled Chi Square *	df	Scaling correction factor	RMSEA and 90% CI	SRMR	CFI	TLI	Comparison model	Chi Square difference	df difference	p value
Configural	731.553	340	1.3037	0.070 [0.063, 0.077]	0.067	0.806	0.784	-	-	-	-
Metric	753.566	359	1.2923	0.068 [0.062, 0.075]	0.073	0.805	0.793	Configural	18.476	19	0.491
Partial scalar	778.354	374	1.2801	0.068 [0.061, 0.075]	0.075	0.800	0.797	Metric	22.809	15	0.088
Scalar	822.301	378	1.2765	0.071 [0.064, 0.077]	0.079	0.780	0.779	Metric	77.543	19	< 0.001
								Partial scalar	56.704	4	< 0.001
Equal means	825.591	379	1.2755	0.071 [0.064, 0.077]	0.080	0.779	0.779	Scalar	3.759	1	0.053
Equal variances	833.153	379	1.2757	0.071 [0.065, 0.078]	0.106	0.775	0.775	Scalar	13.548	1	< 0.001

Note. In the partial measurement invariance model, equality constraints on the three intercepts were relaxed: Q7, Q10, Q14, and Q20. The model with equal means and the model with equal variances were based on the scalar model. * All Chi Square values are statistically significant ($p < 0.0001$).

Figure 1

Distribution of Responses to Item 16 on the SDI:SR French Translation