Adapting of Inviting/Disinviting Index into Turkish *

Semra Sungur [1], Dekant Kıran [2]

Abstract

The aim of the present study was to examine adaptability of Inviting/Disinviting Index with 10 items in two factors into Turkish. For the specified purpose, the instrument was first, translated into Turkish, then 3 separate pilot studies were conducted. In the first pilot study, based on confirmatory factor analysis (CFA) and reliability analyses, two items were identified as candidates for item deletion. In the second pilot study, due to validity concerns, exploratory factor analysis (EFA) was conducted to determine whether alternative factor structures exist in the presence of these two items. The EFA provided evidence for two-factor structure with 10 items. Finally, in the third pilot study, CFA supported two-factor structure of Turkish version of the IDI. Mean interitem correlations were deemed acceptable. In addition, one of the items was found to be non-invariant across gender. The two-factor IDI was found to be invariant across gender permitting the loading of this item to vary. Regression analysis indicated that factors of the IDI were positive predictors of students' self-efficacy as measured by Motivated Strategies for Learning Questionnaire.

Introduction

Bandura (1977) suggested that human functioning is greatly influenced by self efficacy beliefs which refer to "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p.3). Individuals tend to choose and participate in an activity that they believe it would result in desired consequences. If they do not believe in their abilities, they tend to avoid engaging in such kind of an activity. Accordingly, in educational settings, self-efficacious students are likely to engage in accomplishing a task, while those with low self efficacy are likely to avoid it (Pintrich & Schunk, 2002).

According to Bandura, self-efficacy beliefs are derived from four principal sources: mastery experiences, vicarious experiences, verbal persuasions and emotional arousal. Mastery experience is considered as the most powerful source of efficacy beliefs because it involves students' interpretations of their past performance (Bandura, 1986, 1997). The vicarious experience of observing others perform a task can also contribute to the development of efficacy beliefs. Verbal persuasions and social support encourage students to persist in the face of difficulties (Zeldin & Pajares, 2000). Finally, stress, fatigue,

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[1] Middle East Technical University, Faculty of Education, Department of Elementary Education, Turkey, ssungur@metu.edu.tr
[2] Gaziosmanpaşa University, Faculty of Education, Department of Elementary Education, Turkey, dkiran@metu.edu.tr

tension, and pain can be considered as physiological states. These four sources, which have been researched extensively, are suggested to be influential when making judgments on self efficacy.

Moreover, Bandura (1997) proposed that in addition to the four hypothesized sources of self-efficacy, there may be other sources that play an important role in the formation of self-efficacy beliefs. For instance, messages sent and received by individuals may be influential in the development of beliefs about themselves (Valiante & Pajares, 1999). Accordingly, the *invitational approach* can be considered as an additional source of self-efficacy. Actually, the invitational approach in educational settings proposes that students can send positive and inspiring messages to others and to the self. Inviting messages tell students that they are valuable, responsible, and able. Therefore, such positive invitations can help students use their potential and enhance their performance (Usher & Pajares, 2006). In fact, the empirical study conducted by Pajares (1994) showed that sending empowering and inspiring messages to the self (inviting with self) and to others (inviting with others) helps students foster their self-efficacy beliefs. Likewise, Valiante and Pajares (1999) reported that inviting with self and inviting with others were positively associated with students' self-efficacy. In addition, Usher and Pajares's (2006) study revealed significant relationships between invitations and self-efficacy. In a more recent research, Kıran and Sungur (2012) also examined inviting with self and inviting with others as additional sources of students' science self-efficacy and they found that these two variables were significant predictors of students' science self-efficacy. Therefore, invitational approach, which advocates that students should send positive messages to others and themselves to foster beliefs about their capabilities, appears to have potential in offering promising directions for educators to help students nurture their self-efficacy beliefs (Usher & Pajares, 2006; Valiante & Pajares, 1999). Since self-efficacy has an important role in students' motivation, learning, and achievement, the investigation of such additional sources as invitations is crucial in improving students' academic performance and to strengthen and refine the principles of social-cognitive theory regarding the development of students' self-efficacy beliefs (Britner & Pajares, 2006; Usher & Pajares, 2006).

Accordingly, the purpose of the current study is to adapt Inviting/Disinviting Index (IDI) originally developed by Wiemer and Purkey (1994) into Turkish. Adaptation of the instrument will allow the researchers in Turkey to examine invitations as additional sources of self-efficacy

Method

Participants

Three separate samples were used to validate the IDI for Turkish middle school students. Convenient sampling was utilized to collect data. Each sample consisted of middle school students attending public schools in central region of Turkey. Students were from middle to high socio-economic status. Samples ranged in age from 12 to 16 years. In each sample, number of girls and boys were comparable. Sample 1 (n = 208) was utilized to conduct confirmatory factor analysis and reliability analyses. Sample 2 (n = 637) was utilized to determine number of factors through exploratory factor analysis and reliability analyses, and finally Sample 3 (n = 869) was utilized to examine extracted factor solution through confirmatory factor analysis, conduct reliability analyses, examine invariance across gender and provide further validity evidence for the IDI.

Instrumentation

Inviting/Disinviting Index (IDI) was developed by Wiemer and Purkey, (1994) to assess the degree to which individuals are inviting to self, inviting to others, disinviting to self, and disinviting to others. As shown in the Appendix, in the present study, revised version of the IDI (Schmidt,Shields & Ciechalski, 1998; Valiante & Pajares, 1999) with two scales inviting with self and inviting with others was adapted to assess the degree to which students invite with self (e.g., "I congratulate myself on my successes" n = 5 items) and with others (e.g., "I am quick to recognize the value of other people" n = 5 items). It is a seven-point Likert type instrument ranging from 1 (never) to 7 (always). Test-retest reliability ranged from .67 to .83 for the original IDI and .41 to .59 for the revised version (Schmidt,et al., 1998).

During the adaptation of IDI into Turkish, the instrument was, firstly, translated into Turkish by the researchers. Translated version of the instrument was examined by two instructors from the faculty of education for its content validity. They also judged the quality of items concerning clarity, sentence structure, and comprehensiveness. In addition, the grammar structure of the translation was examined by one of the instructors from Academic Writing Center in a large university. According to the suggestions of instructors from both faculty of education and Academic Writing Center, some items of IDI was corrected. After that, the instrument was read by five middle school students. Some words were changed with their synonyms. This revision made the items more clear and understandable by middle school students.

Motivated Strategies for Learning Questionnaire (MSLQ), developed by Pintrich, et al. (1993), was used to assess students' self-efficacy. It is a self-report instrument on a seven-point Likert scale, (1 = not at all true of me to 7 = very true of me). The MSLQ consists of 81 items in eleven sub-scales designed to be modular that can be utilized by the researchers in line with the scope of their studies (Pintrich, et al. 1993). It was translated and adapted into Turkish by Sungur (2004). Confirmatory factor analysis was conducted to validate the factor structure and fit indices similar to the original version were obtained. In the present study, inviting with self (IWS) and inviting with others (IWO) subscales of the IDI were regressed on self-efficacy for learning and performance sub-scale of the MSLQ (e.g., "I believe I will receive an excellent grade in this class, $n = 8$) to provide further validity evidence for Turkish version of the IDI. Because self-efficacy is context specific and individuals can report different levels of self-efficacy for different courses, participants completed this sub-scale of the MSLQ considering only their science class. In the current study, coefficient alpha was found to be .89 for the self-efficacy for learning and performance sub-scale with a mean inter-item correlation of .53.

Results

Pilot Study 1

Turkish version of the IDI was, first, administered to 208 middle school students. The data were analyzed through confirmatory factor analysis conducted using LISREL 8.80 (Jöreskog & Sörbom, 2007) in order to validate the proposed factor structure of the IDI. Results revealed an adequate model fit ($\chi2/n = 4.5$; RMSEA = .05; SRMR = .06; GFI = .95; CFI = .92; and NNFI = .90). However, examination of Lambda-X estimates which are analogous to factor loadings in exploratory factor analysis were low for item 3 and item 9. Corresponding pattern coefficients (Lambda-X estimates) were .25 and .35, respectively. In addition, when item-total correlations were examined for each proposed factor, it was found that these two items (one from the IWS and the other from the IWO) did not contribute well to the total variability, resulting in a lower internal consistency. Deletion of these items led to increase of mean inter-item correlations from 0.32 to. .39 for the IWS and from .25 to .32 for the IWO. According to Robinson, Shaver, and Wrightsman. (1991), mean inter-item correlations of .30 and above and .20 to .29 provide exemplary or extensive evidence for internal consistency, respectively. When the items were retained, coefficient alpha values were .71 for IWS and .62 for IWO. Overall, taking CFA results and internal consistencies of the IWS and IWO into consideration, item 3 and item 9 were candidate for item deletion. However, Netemeyer, Bearden, and Sharma, (2003) suggested that, if particular items contribute to content validity, even though they do not, meet statistical criteria these items should be retained to be investigated in the further studies. Still, in order to examine whether there are alternative factor structures in the presence of these two items, exploratory factor analysis was decided to be conducted with a new sample.

Pilot Study 2

Working with a new sample (*n* = 637), exploratory factor analysis (EFA) was conducted to determine the number of factors. The Kaiser-Meyer-Olkin measure of sampling adequacy was .72 and Barlett's Test of Sphericity was statistically significant, $\chi^2(45)= 680.145$ *p*< .05, suggesting that the data were suitable for factor analysis. In order to decide on the number of factors, several criteria were used; Kaiser-Guttman criterion of Eigenvalues greater than 1, scree plot, parallel analysis, and inspection of factors with sufficient number of items loading significantly (Matsunaga, 2010). All of these criteria suggested two-factor structure of the IDI. The first factor accounted for 22.91 % of the variance in the correlation matrix. This factor included 5 items related to inviting with self; Factor loadings ranged from .33 to .75. The second factor explained 17.15 % of the variance in the correlation matrix. This factor included 5 items related to inviting with others. Factor loadings ranged from .44 to .73. Thus, the EFA results supported two-factor structure of the IDI with a total of 10 items. The mean inter-item correlations were .29 and .22 for the IWS and the IWO, respectively. Based on CFA and EFA results from Sample1 and Sample 2, all of the items were decided to be retained in the IDI.

Pilot Study 3

In order to examine the proposed factor structures in detail, and provide further validity evidence a second confirmatory factor analysis was conducted with a sample of 869 middle school students. The two sub-scales, inviting with self and inviting with others, were considered as factors. Results indicated that there was evidence to support good model-to-data fit (χ^2/n = 2.6; RMSEA = .05; SRMR = .04; GFI = .97; CFI = .95; and NNFI = .93).

In order to further evaluate the model, pattern coefficients and structure coefficients were examined. Pattern coefficients are presented as Lambda- estimates in the completely standardized section of the LISREL output. Thus they represent factor loadings. Structure coefficients indicate the correlations between observed variables (items) and factors and calculated as the product of Lambda-X estimate and Phi coefficient. According to Graham, Guthrie, and Thompson (2003) both pattern and structure coefficients should be interpreted in any measurement models especially when factors are correlated because observed variables will be correlated with all factors in the presence of factor correlation. In the current study, the phi coefficient (φ = .45) revealed a moderate correlation between two factors so it was appropriate to report both the pattern and structure coefficients. As shown in Table 1, each item had a high correlation with the designated factor and a small correlation with the non-designated factor. All the coefficients were statistically significant.

Table 1. Pattern and Structure Coefficients for the IWS and the IWO items of IDI

Items	Factor 1: Inviting with Self	Factor 2: Inviting with Others
Item 4	*.59*	.27
Item 6	*.36*	.16
Item 7	*.64*	.29
Item 9	*.47*	.21
Item 10	*.58*	.26
Item 1	.17	*.38*
Item 2	.29	*.65*
Item 3	.15	*.33*
Item 5	.22	*.49*
Item 8	.25	*.56*

Note: Italicized numbers are the pattern coefficient for each item with its designated factor.

Nonitalicized numbers are the structure coefficient of each item with its nondesignated factors.

Although the CFA results supported 2-factor structure of the IDI, reliability analyses showed that internal consistencies for the factors were low (iws = .65 and iwo = .58). However, mean inter-item corerelation of .27 for the IWS and .22 for the IWO provided extensive evidence for internal consistency. Clark and Watson (1995) suggested that mean inter-item correlation is more useful than coefficient alpha as a measure of internal consistency.

Measurement Invariance across Gender

Having provided a good model fit, measurement invariance across gender was assessed using multigroup confirmatory factor analysis. If an evidence for invariance across samples is demonstrated, this will improve the generalizability of the instrument. While assessing the invariance, firstly, configural invariance (baseline - unconstrained model) was tested. Next, metric (weak) invariance was tested in which factor loadings were invariant across groups. Then, besides factor loadings, invariance of factor variances, factor covariances, and individual item error terms were tested in order. In the present study, in order to test measurement invariance, changes in CFI rather than chi-square difference ($\Delta\chi^2$) were examined due to sensitivity of chi-square test to sample size (Cheung & Rensvold, 2002; Chen, 2007). Following recommendations by Cheung and Rensvold (2002) and Chen (2007) cut-off values of ΔCFI ≤ 0.01 were examined and it was found that some of the ΔCFI values were greater than 0.01. This finding implied the presence of some items not invariant across gender. As a result of the careful examination of the items across gender, item 1 which belongs to the IWO appeared not to be invariant across gender. Because item 1, appeared to be variant across gender, one solution may involve deletion of this item. When CFA was conducted after deleting the item, it was found that model fit does not change ($\chi2/n = 2.7$; RMSEA = .05; SRMR = .04; GFI = .98; CFI = .95; and NNFI = .93) and coefficient alpha for the IWO becomes .57. In addition pattern coefficients were found to change from .36 to .64 for the IWS and from .34 to .65 for the IWO. Phi coefficient was .42 indicating a moderate correlation between the factors. Thus, it appears that deletion of the item does not cause a considerable change in the psychometric properties of the instrument. Another solution may involve retaining this item, but permitting the factor loading of the item vary while constraining factor loading of other items to be equal. (Cheung, & Rensvold, 1999). When invariance was tested again by constraining the loadings of invariant items to be equal across groups, while permitting the loading of the non-invariant item (item 1) to vary invariance across gender was established (see Table 2).

Table 2. Measurement Invariance of the IDI

Model	χ^2	df	CFI
Baseline	160.14	70	.938
Factor loadings invariant	168.14	79	.938
Factor loadings and factor covariances invariant	173.94	79	.935
Factor loadings, factor variances invariant	168.14	79	.938
Factor loadings, variance of error terms invariant	192.98	87	.928

Further Evaluation of Validity

As potential sources of self-efficacy, inviting with self (iws) and inviting with others (iwo) scores were regressed on self-efficacy scores using LISREL 8.80 (Jöreskog & Sörbom, 2007). Results indicated a perfect model fit (RMSEA = .00; SRMR = .00; GFI = 1.00; CFI = 1.00; and NNFI = 1.00). Inviting with self and inviting with others explained 15 % of the variance in self-efficacy scores. Both of the variables significantly and positively contributed to the prediction of students' self-efficacy.

Discussion and Conclusions

The purpose of the current study was to adapt the IDI. Into Turkish For the specified purpose, the instrument with a total of 10 items was first, translated into Turkish, by taking expert opinions and students' suggestions into consideration. Then, translated version of the instrument was administered to 208 middle school students as part of the first pilot study. CFA results supported proposed factor structure. However, a detailed examination of CFA results and reliability analyses suggested two items as candidates for item deletion because factor loadings of these two items were relatively small and they did not contribute to the total variability well. However, considering the contribution of these items to the content validity, it was decided to keep these two items and conduct second pilot study to examine alternative factor structures (Netemeyer, et al., 2003). EFA results supported two factor structure of the IDI with 10 items and all the items were loaded on intended factors. All items were found to contribute to the total variability. In the third pilot study, CFA was conducted again to further analyze proposed factor structure and provide additional validity evidence. CFA results provided a good model fit. Fit indices and loadings were better compared to the first CFA conducted as part of pilot study 1. This difference may be due to the sample size. According to Comrey and Lee (1992) (as cited in Tabacahnick & Fidell, 2007), sample size of 200 is fair, 300 is good, and 500 is very good for factor analysis. In the first pilot study, the sample size was 208. Following the suggestions of Comrey and Lee, although the sample size of the first pilot study was reasonable, results of the second CFA from the third pilot study may provide more valid conclusions with a sample size of 869.

In pilot study 3, results also revealed that item 1 (i.e. I plan time for enjoyable activities with others) appeared to be non-invariant across gender. This finding implies that this item may function differently for boys and girls. Marsh and Hocevar (1985) reported that if most of the items are invariant, factor means can be compared and failure to attain full factorial invariance can be insignificant from practical point of view. Still, it is suggested that researchers permit the factor loading of item 1 to vary when comparing factor means. An alternative approach may involve deletion of the item. Current findings revealed that psychometric properties of the instrument were similar in the presence and absence of this item. Because remaining items are all invariant across gender, this item was decided to be retained in the IDI due to content validity concerns. However, it should be kept in mind that presence of this item may threaten the generalizability of the instrument, although this threat may be trivial.

In order to provide further validity evidence for the IDI, IWS and IWO was regressed on students' science self-efficacy. In the present study, because self-efficacy is context specific and may change depending on the course, participants' self-efficacy specifically in science was measured as criterion variable. The results indicated a perfect model fit. IWO and IWS were found to be positive predictors of students' self-efficacy. This finding was consistent with the previous research showing invitations as significant sources of self-efficacy (Kıran & Sungur, 2012; Pajares, 1994; Usher & Pajares, 2006) and provides further validity evidence for the IDI. At this point, it is important to note that, although self-efficacy was measured as domain-specific construct, invitations were measured by the IDI as domain-general constructs. Kıran and Sungur suggested revision of the IDI assessing the messages sent to the self and to others specifically in science or other domains depending on the purpose. Accordingly, the revised instrument may contain items such as ''I congratulate myself on successes in science'' or ''I work cooperatively with my classmates in science''(Kıran & Sungur, 2012, p.629). When such a revision is made and items become domain-specific, internal consistency of the instrument can also be improved. Indeed, in the present study, although mean interitem correlations provided extensive evidence for internal consistency coefficients of alpha were low. However, Clark and Watson (1995) suggested that mean interitem correlation is more useful than coefficient alpha as a measure of internal consistency.

Overall, the current study suggests that Turkish version of the IDI can be used as a valid and reliable measure of the degree to which middle school students' send positive messages to self and to others. As demonstrated in the present study and previous research, IWS and IWO are significantly related to self-efficacy. Thus, the instrument can be used as a diagnostic tool to improve students' self-efficacy which is shown to be highly associated with their academic performance by a huge amount of both theoretical and empirical research in the literature. However, the instrument should be validated with different population to enhance its external validity.

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Appendix

Inviting Self Items

I am quick to recognize my own value

I plan time for enjoyable activities that I can do on my own

I congratulate myself on my successes

I forgive myself for my misbehavior and mistakes

I am impressed with my own abilities.

Inviting Others Items

I like to include other people in enjoyable activities

I congratulate others on their successes

I forgive others for their misbehavior and mistakes

I am impressed with the abilities of other people.

I am quick to recognize the value of other people

(Valiante & Pajares, 1999, p. 38)