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Psychometric Testing of the Children's Resourcefulness Scale

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Abstract

Resourcefulness is known to reduce depression in adults, but its effects on children are less well known, possibly for lack of a psychometrically sound measure. This study examined the reliability and validity of the 32-item Children's Self-Control Scale (C-SCS), which measures resourcefulness, in 122 school-aged children. Standard scale refinement methods produced a 10-item scale with $\alpha = .72$ and correlations with the C-SCS ($r = .86$), positive thoughts ($r = .38$), and depressive symptoms ($r = -.32$).

Factor analysis revealed two factors: problem-solving and delay of gratification. The 10-item scale may be useful for identifying children who are not resourceful and are at risk for depression.

PROBLEM: Resourcefulness is known to reduce depression in adults, but its effects on children are less well known, possibly for lack of a psychometrically sound measure.

METHODS: This study examined the reliability and validity of the 32-item Children's Self-Control Scale (C-SCS), which measures resourcefulness, in 122 school-aged children.

FINDINGS: Standard scale refinement methods produced a 10-item scale with $\alpha = .72$ and correlations with the C-SCS ($r = .86$), positive thoughts ($r = .38$), and depressive symptoms ($r = -.32$). Factor analysis revealed two factors: problem-solving and delay of gratification.

CONCLUSIONS: The 10-item scale may be useful for identifying children who are not resourceful and are at risk for depression.

Keywords

Measurement, reliability, resourcefulness, self-control, validity

The existence of significant depressive disorders in children was once doubted because children were thought to lack the psychological and cognitive structures necessary to experience these problems (Kloos, CoUins, Weller, & Weller, 2007; Son & Kirchner, 2000). However, the evidence has now shown that children and adolescents not only experience the whole spectrum of mood disorders, but also suffer from significant associated morbidity and mortality (Kloos et al, 2007; Son & Kirchner, 2000). Statistics have shown that depression affects 1-9% of school-age children and 4-8% of adolescents (Louters, 2006). Many factors play a role in school-aged children's depression, including genetics, family dysfunction, peer problems, chronic illness, prior depressive episodes, and having a first-degree relative with a history of depression (Carlson, 2000; Castiglia, 2000; Louters, 2006).

Also, Kaslow, Rehm, Pollack, and Siegel (1998) have reported that children (ages 8-12 years) who lack self-control skills have more depressive symptoms and a more depressive attributional style, defined as a negative or pessimistic way of explaining why things happen (Kaslow et al., 1998). More recently, David-Ferdon and Kaslow (2008) provided evidence of the efficacy of cognitive-behavioral programs focusing on development of self-control skills for treating childhood and adolescent depression.

Conceptualization of Resourcefulness

According to Rosenbaum (1990), self-control skills constitute the core of resourcefulness. Redressive self-control skills are used to restore one's normal functioning level after it has been disturbed and reformative self-control skills are used to facilitate the replacement of maladaptive or unhealthy behaviors with healthy or more effective actions (Rosenbaum, 1990). Redressive and reformative self-control skills are enacted through such behaviors as problem solving and delay of gratification (Rosenbaum, 1990). In addition, these cognitive and behavioral self-control skills can be used to cope with unpleasant internal processes, including cognitions, emotions, and sensations, and to facilitate effective performance of daily activities (Rosenbaum, 1990). The SelfControl Schedule developed by

Rosenbaum (1980) for adults is the accepted measure of this cognitive-behavioral repertoire of self-control skills termed "learned resourcefulness."

The self-control skills constituting resourcefulness are learned throughout life, beginning in early childhood, and they develop with various types of learning (i.e., conditioning, modeling, and training) in the context of one's environment, including the home and family (Rosenbaum, 1990; Zauszniewski, Chung, Chang, & Krafcik, 2002). It is thought that children need to develop appropriate cognitive-behavioral skills, termed resourcefulness, to maintain mental health and prevent depression (Zauszniewski et al., 2002). Failure to develop this repertoire of skills can result in helplessness, poor performance, negative thought patterns, and depression.

Positive Outcomes of Resourcefulness

A number of studies of resourcefulness have been conducted in adults and it has been found effective in decreasing depressive thoughts and symptoms (e.g., Esteve, RamírezMaestre, & Lopez-Marinez, 2008; Zauszniewski & Chung, 2001), enhancing psychological well-being and quality of life (Dirksen, 2000; LeFort, 2000; Pedro, 2001), and increasing ability to cope effectively with life stressors (Akgun & Ciarrochi, 2003). However, research on resourcefulness in adolescents and children has been limited to a few studies.

In adolescents, greater resourcefulness has been associated with fewer depressive symptoms (Huang, Sousa, Tu, & Hwang, 2005), greater engagement in academic self-control behaviors (Kennett & Keefer, 2006), better ability to deal effectively with academic stress (Akgun & Ciarrochi, 2003), more success in weight loss programs (Kennett & Ackerman, 1995), and more success in quitting smoking (Kennett, Morris, & Bangs, 2006).

In school-aged children, greater resourcefulness has been found to be significantly associated with fewer depressive symptoms and greater ability to function in daily activities (Chang, Zauszniewski, Heinzer, Musil, & Tsai, 2007). Also, research on healthy siblings (aged 9-18 years) of children with cancer has shown that greater resourcefulness was associated with lower anxiety and stress, and fewer psychosomatic symptoms, and suggested that teaching resourcefulness skills to children can improve their coping and adjustment to a sibling's serious illness (Hamama, Ronen, & Feigin, 2000; Hamama, Ronen, & Rahav, 2008). However, while the studies of children suggest that resourcefulness is related to a number of positive mental health outcomes, measurement of the construct of resourcefulness is questionable. One or the other of two forms of the Children's Self-Control Scale (C-SCS; Rimon, 1980; Rosenbaum & Ronen, 1991) has been used in the few published studies conducted with children, but there is no published psychometric testing of either version of this measure of resourcefulness.

Measures of Children's Resourcefulness

The first and longer version of the C-SCS consists of 32 items (Rimon, 1980). Preliminary testing of the scale in Hebrew with 105 Israeli children (ages 10-13 years) was conducted by Rimon (1980) under the mentorship and guidance of Rosenbaum, who developed the items for the measure as a downward extension of the adult Self-Control Schedule (Rosenbaum, 1990). Although Rosenbaum (personal communication, April 19, 2009) claimed that this 32-item scale was developed for adolescents, it has been used in children ages 9-12 years. The C-SCS measures children's ability to use self-control

strategies for solving problems associated with their behavior (Klingman, Melamed, Cuthbert, & Hermecz, 1984). Using a 6-point Likert scale, they rate each item from extremely descriptive to extremely nondescriptive. A high composite score, after reverse scoring of negatively phrased items, indicates greater resourcefulness (Rimon, 1980).

This 32-item measure of children's resourcefulness (in Hebrew) had an acceptable internal consistency coefficient of .78 (Rimon, 1980) and its construct validity was demonstrated through significant correlations with measures of social adjustment and depression. Internal consistency estimates for the English version of the 32-item scale have been reported as .70 in American school-aged children ages 10-12 years (Zauszniewski et al., 2002), and .73 in a sample of 88 American preadolescent girls aged 9-12 years (Cawley, 2001). Evidence of concurrent validity was established through significant correlations with the Children's Social Adjustment Scale ($r = .46$), and the Children's Depression Inventory (CDI; $r = -.36$) (Zauszniewski, Panitrat, & Youngblut, 1999). However, while the 32-item scale has been reported to be reliable and valid, it is lengthy and potentially burdensome for children to complete and therefore has limited clinical utility.

The second version of the C-SCS consists of the first 17 items of the original 32-item scale. This scale has reported Cronbach's alphas from .50 to .65 in Israeli children (Hamama et al., 2000; Rosenbaum & Ronen, 1991). It uses a 6-point response scale ranging from not like me at all to very much like me; higher scores indicate greater resourcefulness (Hamama et al., 2000; Rosenbaum & Ronen, 1991). Using an English version of the 17-item C-CSC, Ankenbrandt (1986) reported alphas of .64 and .57 at two measurement points in 60 children (ages 10-12 years). The alpha of the 17-item version of the C-SCS translated into the Thai language was very low ($\alpha = .23$) (Preechawong et al., 2007). However, Preechawong and colleagues (2007) concluded that the low alpha in their study was attributable to cross-cultural differences in the interpretation of delay of gratification, as described by Bembenuddy (2007).

Given the importance of resourcefulness in preserving mental health and preventing depression, it would be advantageous to teach resourcefulness skills to American schoolaged children.

However, establishment of a reliable and valid measure of resourcefulness for American, English-speaking children is a necessary first step. Therefore, the study reported here examined the reliability and validity of the 32-item C-SCS and explored the possibility of optimizing the scale's length to reduce the response burden on school-age children. Permission for examining the reliability and validity of the C-SCS and optimizing its length was obtained from Rosenbaum.

Methods

Sample and Setting

To examine the psychometric properties of the Children's Version of the Self-Control Scale, a convenience sample of 122 fifth- and sixth-grade children between the ages of 10 and 12 were recruited from four suburban public schools in the Midwestern United States. There were no restrictions by race or ethnicity. The study was part of a larger study of children's resourcefulness (Zauszniewski et al., 2002), in which both the child and mother participated. A total of 312 fifth- and sixth-graders in the four schools were given letters asking them and their mothers to participate in the

study and response cards to indicate interest or refusal. All the response cards were returned. Of the 312 mother-child dyads contacted, 180 refused, six were not eligible because the children were already 13 years old, and two children had no female caretaker. Although 124 children participated in the study, there were two cases of twins and one twin from each of the pairs was randomly selected for the analysis.

The final sample represented approximately 40% of the children enrolled in the fifth and sixth grades of the four schools. The sample was 98% Caucasian; half were boys and half were girls. About 82% of the children came from two-parent homes; 18% lived with only their mother. Almost 52% of the children were 11 years old, while 25% were 10, and 23% were age 12. The majority reported that they performed better than average in both math and English (55% and 56%, respectively); 38% and 42% reported average performance in math and English, and 7% and 2% reported below average performance in math and English. The sample of 122 children was small for rigorous psychometric analyses but met the minimal acceptable standard of three subjects per item on a scale (Hair, Anderson, Tatham, & Black, 1998; Nunnally & Bernstein, 1994).

Instruments

Children's resourcefulness was measured by the 32-item version of the C-SCS, which assesses children's tendencies to use self-control strategies for managing internal processes, resolving behavioral problems, and managing daily tasks (Rimon, 1980; Rosenbaum, 1990). The Likert-type items are scaled in six descriptive categories, ranging from extremely descriptive (5) to extremely nondescriptive (0), with no middle score to indicate a neutral response. A high composite score, after reverse scoring of negatively phrased items, indicates greater resourcefulness (Rimon, 1980). As noted above, there is minimal evidence of the scale's reliability and validity, particularly with American, English-speaking children.

Two validation measures were selected for this analysis based on Rosenbaum's (1990) theory of resourcefulness, which posits associations between resourcefulness and process-regulating cognitions such as automatic thoughts, and target outcomes such as depressive symptoms. Therefore, measures of children's automatic thoughts and children's depressive symptoms were analyzed in relation to resourcefulness.

Automatic thoughts were measured by the Cognitive Triad Inventory for Children (CTI-C) (Kaslow, Stark, Printz, Livingston, & Tsai, 1992), a 36-item measure that captures automatic thoughts reflecting the child's views of self, the world, and the future that may be associated with depression. All items on this scale are positively worded and would therefore be inversely correlated with depression. Each item states a specific thought about self, the world, or the future, and for each item the children are given three possible response alternatives (yes, maybe, or no). Scores range from 0 to 72 for the total CTI-C scale, with higher scores indicating more positive thought patterns. Internal consistency of the CTI-C in a sample of 132 children in grades 4 through 7 was reported as .92 (Kaslow et al., 1992). Concurrent validity has been demonstrated through significant correlations with measures of self-esteem and hopelessness, in the expected directions. Discriminant validity for each subscale and for the total CTI-C was established by accurate classification of 62% of children in four known diagnostic groups: depressed, anxious, depressed and anxious, and controls (Kaslow et al., 1992).

Depressive symptoms were measured by the CDI (Kovacs, 1985), a 27-item self-report questionnaire designed to measure severity of depressive symptoms for children aged 7-17 years. Estimates of internal consistency have been reported to range from the low to the upper .80s (Reynolds, Andreson, & Bartell, 1985). Test-retest reliability coefficients have ranged from .38 to .87. Construct validity has been supported by a significant correlation with self-esteem ($r = .66$) (Greening, Stoppelbein, Dhossche, & Martin, 2005). Discriminant validity was reported between psychiatric (e.g., child guidance group) and medical (e.g., pediatric outpatient group) samples of children (Kovacs, 1985).

Data Collection

Data were collected during face-to-face interviews with the children in the parent study. In addition to completing the measure of resourcefulness, the children supplied information on gender, age, grade in school, and a self-rating of their academic performance, and completed measures of their automatic thoughts and depressive symptoms.

Analysis

Internal consistency reliability and construct validity of the two versions of the C-SCS were examined. Three parameters were used to evaluate each item on the C-SCS: item-tototal scale correlations, alpha if item deleted, and factor loadings when forced onto a single factor. Corrected item-tototal scale correlations, in which each item was correlated with the total scale score excluding itself, were then calculated (DeVellis, 2003). Corrected item-to total scale correlations should range between .30 and .70 (Ferketich, 1991) and it is recommended that items with correlations below .30 be removed from a scale (Cronk, 2004; Nunnally & Bernstein, 1994). Next, Cronbach's alpha if item deleted was examined for the C-SCS. The criterion used for item deletion was substantial improvement ($>.05$) of the scale alpha without an item (DeVellis, 2003).

In order to preserve the conceptual integrity of the scale, confirmatory factor analysis using maximum likelihood factor extraction and forcing all items onto a single factor was planned. The theoretical rationale for selection of a single factor solution was that it was desirable for the scale to measure a single construct, resourcefulness. A level of .32 was set a priori as the criterion for determining whether the items loaded sufficiently on a factor (Tabachnick & Fidell, 2001). Items not meeting that criterion would be recommended for deletion from the scale and further scale refinement would be pursued.

Results

Reliability Analysis

The most meaningful estimate of reliability is internal consistency because it reflects the extent to which a scale assesses a single characteristic or quality, in this case, resourcefulness. Cronbach's alpha for the 32 items on the C-SCS was .69, which fails to meet the minimum criterion of .70 for internal consistency. Cronbach's alpha for the 17-item version was even lower ($\alpha = .55$). When the corrected item-to-total scale correlations on the 32-item scale were examined, 20 items had correlations less than .30. On the 17-item scale, 14 items had correlations below .30. The unsatisfactory estimate for internal consistency and the large number of items with unacceptable corrected item-to-total scale correlations on both versions of the C-SCS indicated poor reliability and suggested a need for scale refinement (Cronk, 2004) in order to establish a reliable measure of

children's resourcefulness, which is a necessary precondition for establishing subsequent validity (Cook & Beckman, 2006).

Scale Refinement

The longer C-SCS measure was selected for scale refinement. As recommended by Cronk (2004), the 20 items with corrected item-to-total scale correlations less than .30 were dropped, a new total scale score was calculated, and the reliability analysis was repeated with the remaining 12 items, resulting in a Cronbach's alpha of .73. However, the corrected item-to-total scale correlation for two more items failed to meet the .30 criterion; they were deleted, and the analysis was repeated with the remaining 10 items. Cronbach's alpha was .72 and the corrected item-to-total correlations for all 10 items exceeded the .30 criterion (Cronk, 2004). These 10 items were retained and are displayed in Table 1.

Next, Cronbach's alphas if item deleted were examined for these 10 items. Since the scale alpha was not improved with removal of any of the 10 items (Table 1), all were retained for subsequent analysis.

Validity Analysis

Before conducting exploratory factor analysis, the adequacy of the sample and the data were examined in relation to specific statistical parameters (Strickland, 2003). The Kaiser-Meyer-Olkin (KMO) index of .755 indicated sampling adequacy (Kaiser, 1974), and Bartlett's test of sphericity ($\chi^2 = 188.05$, $p < .001$, determinant = .20) indicated that the correlation matrix was suitable for factor analysis (Strickland, 2003). Having met the conditions of adequate sample size and suitability of the correlation matrix, the data from the 10-item C-SCS were subjected to exploratory factor analysis using the maximum likelihood method of factor extraction and oblimin rotation, as recommended for exploratory factor analysis (Costello & Osborne, 2005). Maximum likelihood factor extraction was used because scores on the C-SCS were normally distributed, and oblimin rotation was used because resourcefulness theory (Rosenbaum, 1990; Zauszniewski, 2006) suggests that the factors are associated.

Two factors with eigenvalues exceeding 1.00 were identified (Figure 1). The first factor (eigenvalue = 2.92) contained three items, and the second factor (eigenvalue = 1.38) contained seven items. None of the items had cross-loadings of .30 or more on the two factors. Thus, two clean factors emerged within the pattern matrix following oblimin rotation. The two factors were significantly correlated ($r = .44$, $p < .001$). These factors were interpreted as closely reflecting two self-control dimensions of resourcefulness - problemsolving and delay of gratification - which were consistent with Rosenbaum's (1990) theory of resourcefulness.

To examine the conceptual integrity in measuring a single construct, children's resourcefulness, the 10 items comprising the new scale were forced onto a single factor in a confirmatory factor analysis using maximum likelihood extraction (Figure 1). All 10 items had factor loadings that exceeded the minimal criterion of .32 (Tabachnick & Fidell, 2001); 22% of the variance in resourcefulness was explained (see Table 1).

To further establish construct validity, correlations between the shortened 10-item measure and the 32-item and 17-item C-SCS scales and measures of theoretically related constructs were examined. Construct validity of the 10-item C-SCS was assessed by examining the correlation with the full 32-item

measure, as recommended when the original scale cannot be considered a gold standard (e.g., the reference measurement instrument) (Coste, Guillemin, Pouchet, & Fermanian, 1997). The shortened 10-item scale was robustly correlated with the full C-SCS ($r = .86, p < .001$), and with the 17-item C-SCS ($r = .69, p < .001$). These significant correlations indicate that the briefer scale captures a substantial amount of the construct being measured by the full scale and the 17-item shorter version. Correlating a shorter scale with the full 32-item version is commonly done when optimizing scale length, particularly in the early stages of development (Smith, McCarthy, & Anderson, 2000). However, because the correlations between scales containing the same items may be over-inflated, the results require cautious interpretation (Smith et al., 2000). As a partial remedy for minimizing the over-inflation, Smith and colleagues (2000) recommend examination of correlations between the short and long scales and other theoretically related constructs (as shown in Table 2).

The strong correlations in the expected directions between the 10-item C-SCS and measures of positive automatic thoughts ($r = .38, p < .001$) and depressive symptoms ($r = -.32, p < .001$) support its construct validity by providing evidence of associations with constructs reflecting the process-regulating cognitions and target outcomes described in Rosenbaum's (1990) resourcefulness theory. The correlations between the 10-item C-SCS and measures of positive automatic thoughts and depressive symptoms were similar to correlations between the full 32-item measure and the same constructs and were stronger than those obtained for the 17-item C-SCS scale.

Discussion

While few studies using a children's measure of resourcefulness have been published, the majority of them have used a non-English version of the scale. As noted by Behling and Law (2000), translating scales into other languages requires more than establishing its reliability and validity; the translated measure must also meet the requirements of semantic, conceptual, and normative equivalence. Therefore, reliability and validity in one language are not generalizable to another language, and psychometric evaluation of the measure in the target language is essential (Behling & Law, 2000).

The results from the study reported here provide solid support for the reliability and validity of the 10-item C-SCS or Children's Resourcefulness Scale, with American, English-speaking school-age children. Reliability was demonstrated through adequate estimates of internal consistency and homogeneity following refinement of the 32-item scale. Because the C-SCS is designed to capture a single construct, children's resourcefulness (Rosenbaum and Ronen, 1991), internal consistency is essential. This was achieved by reducing the original C-SCS to a 10-item measure.

Construct validity of the 10-item Children's Resourcefulness Scale was supported by significant correlations between the shortened, 10-item measure and the full 32-item C-SCS scale and with measures of theoretically related constructs, including automatic thoughts and depressive symptoms. However, the correlation between the new 10-item and the original 32-item scales is inflated because of the overlap of items on the two scales and must be interpreted with caution. Yet, this is a widely used method for examining the degree to which the shorter scale captures the same construct the original scale was designed to measure. Further, the findings of reliability and validity are limited to American school-age children, and further psychometric testing with larger and more diverse samples is recommended. Finally, the two measures should ideally be administered to the same sample at

different data collection points, rather than simultaneously (Smith et al, 2000). The overlap of item content between the two scales would still exist, though this is partially remedied by the correlations of both the short and long instruments with theoretically related constructs (Smith et al., 2000). That is, both measures of children's resourcefulness were highly correlated with measures of children's positive automatic thoughts and depressive symptoms, which are indicators of process-regulating cognitions and health outcomes in Rosenbaum's (1990) theory of resourcefulness. These correlations provide strong support for the view that the basic behavioral repertoire constituting resourcefulness plays a significant role in promoting mental health and preventing depression (Rosenbaum, 1990; Zauszniewski, 2006).

Factor analysis was used to further examine the construct validity of the 10-item measure of children's resourcefulness, and two correlated factors were identified. All 10 items had factor loadings that exceeded the minimal criterion (Tabachnick & Fidell, 2001). Interestingly, the positively worded items loaded on one factor (problem solving), while the negatively worded items loaded on the second factor (delay of gratification). Similarly, many researchers have reported a two-factor solution for the Rosenberg Self-Esteem scale that reflected positive and negative dimensions (Carmines & Zeller, 1979; DiStefano & Moti, 2006; Hensley & Roberts, 1976). However, Carmines and Zeller (1979) found that the two factors were highly correlated, suggesting that the RES scale reflected a single substantive factor, and the two factor solution was the result of a methodological artifact associated with item wording. Likewise, in the study reported here, the two factors derived from factor analysis - problem solving and delay of gratification - were highly correlated.

The two factors that emerged with the children's resourcefulness scale reflect two of the three factors that have been identified in the theoretical literature and in factor analytic studies of the adult measure of resourcefulness (Rosenbaum, 1990; Zauszniewski, 1997). Zauszniewski (1997) labeled the three factors in the adult measure as self-control, self-direction, and self-efficacy. Items reflecting postponement of gratification loaded on the self-control factor, while items measuring problem solving loaded on the self-direction factor. In the children's measure of resourcefulness, a factor reflecting self-efficacy, which would indicate a belief in one's ability to cope with adversity, did not emerge.

The factor of delayed gratification can be framed within a self-regulatory process. That is, as the brain structure matures, a child is more able to consciously see the benefits of waiting for something he or she desires. Problem solving can be viewed through the lens of adaptation (Sroufe, Egeland, & Kreutzer, 1990) whereby a child's ability to problem-solve is contingent on development of temperament, cognitive competence, and parent-child interactions. Since the child's development is an ongoing, multilayered process well into the twenties, it is possible that self-efficacy in the school aged child may be undeveloped. However, since none of the C-SCS items of the specifically measured self-efficacy, it is not surprising that a factor reflecting children's self-efficacy did not emerge.

Factor analytic studies of the Children's Resourcefulness Scale are needed to further investigate how items load on different factors and how much variance is explained by the factors, and to ensure that the items truly reflect inter-item, rather than intra-individual correlations. Also, as noted above, further examination of the psychometric characteristics of the newly developed 10-item Children's Resourcefulness Scale is recommended with children who represent a broader age group and more diverse racial/ethnic backgrounds.

The findings from this analysis of the psychometric properties of the C-SCS measure of resourcefulness in children yield promising evidence that the 10-item Children's Resourcefulness Scale has acceptable reliability and validity and is potentially useful for assessing self-control skills for children that are important for early intervention and prevention of depression in childhood and adolescence. Potential clinical applications for the Children's Resourcefulness Scale include use in elementary and secondary school assessment and mental health interventions, by child guidance and evaluation centers, and by pediatricians, who are often the first health care provider a youth sees for treatment.

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Sidebar

Given the importance of resourcefulness in preserving mental health and preventing depression, it would be advantageous to teach resourcefulness skills to American school-aged children.

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