Homework Expectancy Value Scale for high school students: Measurement invariance and latent mean differences across gender and grade level

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ABSTRACT

The current study validated the Homework Expectancy Value Scale (HEVS) for high school students. Results revealed that the HEVS consisted of two distinct but related subscales: Expectancy and Value. Given satisfactory measurement invariance, the latent mean differences were further examined across gender (males vs. females) and grade level (10th vs. 11th). Results revealed that, compared with males, females had significantly higher scores in Value. Meanwhile, there were no statistically significant mean differences across grade level. Finally, consistent with theoretical expectations, Expectancy and Value were negatively correlated with homework distraction, and positively correlated to homework effort, emotion regulation, and completion.

1. Introduction

Research on homework motivational beliefs has increased in recent years (Trautwein, Ludtke, Schnyder, & Niggli, 2006; Xu, 2016; Yang, Xu, Tan, & Liang, 2016). This is perhaps not surprising, as homework places more demands on students' capacities to keep themselves motivated in the process. First, homework occurs after-school hours, often in the midst of more attractive activities (e.g., watching TV, playing videogame, texting, and social networking; Verma, Sharma, & Larson, 2002; Xu, 2015). Second, students typically complete their homework assignments with less adult monitoring and time constraints than other achievement related activities such as classwork (e.g., where, when, and how to complete homework tasks; Cooper, Robinson, & Patall, 2006; Corno & Xu, 2004). As increased personal autonomy results in various obstacles that may disrupt students' motivation and engagement (Wolters, 2011), homework presents more of a motivational challenge for many adolescents.

One theoretical framework pertaining to homework motivational beliefs is the expectancy-value model (Brophy, 2010; Eccles, 1983). This model postulates that motivation consists of two major constructs that influence achievement-related outcomes (e.g., performance, persistence, and choice): expectancy and value. Expectancy refers to the likelihood of success in that a learner thinks that he or she can successfully execute a goal-oriented task or behavior. It taps into the question "Can I Do This Task?" (Wigfield et al., 2015, p. 659). Value refers to the relative worth or importance of a particular task in that a learner thinks that the task is worthwhile and useful. It taps into the question "Do I Want to Do This Task?" (Wigfield et al., 2015, p. 659).

Value is further conceptualized as consisting of four subcategories: (a) attainment value (e.g., identity or core personal values), (b) utility value (e.g., relevance or usefulness), (c) intrinsic value (e.g., interest or enjoyment), and (d) cost (e.g., loss of time or valued alternatives).

The corresponding line of research showed that expectancy and value predicted task engagement, course enrollment, persistence, student achievement, and career aspirations (e.g., Bong, 2001; Denissen, Zarrett, & Eccles, 2007; Guo, Marsh, Parker, Morin, & Yeung, 2015; Kosovich, Hulleman, Barron, & Getty, 2015; Richardson, Abraham, & Bond, 2012). For instance, in one recent meta-analysis of 241 unique datasets, Richardson et al. (2012) found that expectancy and valuing education was positively related to college GPA. More recently, based on data from 15-year-old adolescents (*n* = 10,370), Guo et al. (2015) found that expectancy and value predicted advanced math course enrollment in high school, academic achievement, and post-secondary educational choices.

In the case of homework, several researchers found that expectancy and value beliefs were positively related to homework effort and management strategies (Trautwein et al., 2006; Xu, Du, & Fan, 2017). On the other hand, although the related items in these studies were informed by the expectancy-value model and with adequate reliability for these studies, the validity of the homework expectancy and value instrument was not examined. The lack of validation studies in homework was perhaps not surprising, as the research on expectancy and value paid little attention to evaluating the psychometric quality of the expectancy-value theory in general, with very few notable exceptions in the field over the last two decades (e.g., Eccles & Wigfield, 1995; Kosovich et al., 2015).

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Consequently, there is a critical need to validate homework expectancy and value instrument in the current investigation. This line of investigation is important, as homework places unique demands on students to keep themselves motivated in this process (e.g., to enhance or maintain motivation when facing various difficulties, distractions, and temptations; Wolters, 2011; Xu, 2014), and as expectancy and value can powerfully affect task engagement, persistence, completion, and performance (Eccles & Wigfield, 2002; Wigfield et al., 2015). However, without a valid instrument to assess homework expectancy and value, it is hard to open up a promising line of inquiry that links these variables in research on homework (e.g., the linkages among homework quality, expectancy, value, effort, completion, and performance). This line of inquiry is particularly timely, given that homework is affected by more variables than any other educational activities (e.g., homework purposes, individual differences, family help, and teacher feedback; Cooper, 2007).

Value in the expectancy-value model (e.g., Eccles, 1983) is conceptualized as consisting of four subcategories (attainment value, utility value, intrinsic value, and cost). Recently, whereas some researchers continue to treat cost as a subcategory of task value (e.g., Gaspard et al., 2015; Perez, Cromley, & Kaplan, 2014), others suggest that cost is a separate construct from task value (e.g., Barron & Hulleman, 2015; Kosovich et al., 2015). In our current investigation, we focus on homework's utility value for the following reasons. First, much of contemporary research on homework (i.e., both primary studies and meta-analyses) has been largely driven by the instrumental or pragmatic need to understand its relevance or usefulness in promoting a range of academic and nonacademic goals (e.g., Cooper et al., 2006; Fan, Xu, Cai, He, & Fan, 2017; Warton, 2001). Second, and not surprisingly, items relating to task value in previous homework research has centered on its utility value (Trautwein et al., 2006; Xu et al., 2017; Yang et al., 2016).

Because many students are more motivated to do well in some subjects than in others, the previous research on the expectancy-value model has pointed to the importance of employing a domain-specific approach to study students' self-confidence and values in different achievement domains (Andersen & Ward, 2014; Jacobs, Lanza, Osgood, Eccles, & Wigfield, 2002). Recently, it is not surprising that several studies has adopted a similar approach in homework research (e.g., motivation and effort; Hong, Peng, & Rowell, 2009; Trautwein et al., 2006; Yang et al., 2016). Thus, there is a need to investigate the validity of homework expectancy and value instrument in one major achievement domain – math – in the current study, as (a) students typically spend a great amount of time on math assignments (e.g., about 20% to 40% of their homework time; Pezdek, Berry, & Renno, 2002; Yang et al., 2016), and as (b) following through math assignments in particular often presents a major challenge for many students (Landers, 2013).

Although advances have been made in research on achievement motivation over the last decade, less is known about achievement motivation of students from other cultural backgrounds than about European Americans (Wigfield et al., 2015). Yet, motivational beliefs can be influenced by cultural differences, as cultural socialization practices affect student motivation and achievement (e.g., achievement goals, values, and competence beliefs; Eccles, 2009; Markus & Kitayama, 2010; Wigfield et al., 2015).

As a Confucian heritage culture, China highly value education and educational practices (e.g., for self-improvement and self-perfecting; Chen & Uttal, 1988; Martin, Yu, & Hau, 2014; Wang, 2004). Specifically, Chinese teachers, parents, and students (compared with US counterparts) hold more positive attitudes about homework as the major after-school activity. Chinese teachers consider homework more valuable and assign more homework (Cai, 2003; Hong, Wan, & Peng, 2011); Chinese parents are more likely to demand and help children to do well with homework (Cheung & Pomerantz, 2011; Rao, Moely, & Sachs, 2000); Chinese students are more upbeat about homework and devote more time to homework assignments (Cai, 2003;

Chen & Stevenson, 1989). Thus, consistent with the recommendation by Wigfield et al. (2015), it would be highly desirable to extend research on achievement motivation in other countries such as China, particularly as Chinese consider homework as more valuable and important.

The goal of the present study is to validate the Homework Expectancy Value Scale (HEVS) for Chinese high school students concerning math homework. Specifically, the purposes of our study consist of: (a) investigating the factor structure of the HEVS; (b) testing measurement invariance and latent mean differences across gender (males vs. females) and grade level (10th vs. 11th); (c) examining its internal consistency, and (d) studying its validity evidence by investigating the relations between the HEVS and multiple theoretically relevant measures such as homework behavior (effort and completion), homework emotion regulation (emotion management and cognitive reappraisal), homework distraction (tech-related and conventional), and math achievement.

As expectancy and value can powerfully influence task engagement, task completion, and academic achievement (Eccles & Wigfield, 2002; Warton, 2001; Wigfield et al., 2015), the HEVS was hypothesized to be positively associated with homework effort and achievement. Furthermore, we hypothesized that the HEVS would be positively associated with emotion regulation, as expectancy and value were positively related to task engagement (Richardson et al., 2012), and as emotion regulation was positively associated with effort and learning strategies (Xu, Fan, & Du, 2016b). Meanwhile, as expectancy and value can positively affect task persistence (Wigfield & Cambria, 2010), we hypothesized that the HEVS would be negatively correlated with homework distractions.

Our reasoning for studying high school students in our current investigation is that math competence and value beliefs tend to decline during the transition to high school (Jacobs et al., 2002; Wigfield et al., 2015). Thus, we hypothesized that there would be significant latent mean differences in Value and Expectancy between 10th graders and 11th graders, favoring 10th graders.

With respect to gender difference in Expectancy, males have higher math competence beliefs than females at the elementary school level. However, by high school, this difference disappears as males' math competence beliefs declined faster than females' math competence beliefs (Jacobs et al., 2002). Therefore, we hypothesized that there would be no significant latent mean difference in Expectancy across gender. In addition, as there is no differences in math values across gender (Jacobs et al., 2002), we hypothesized there would be no significant latent mean difference in Value across gender.

2. Method

2.1. Participants and procedure

One thousand seven hundred and ninety-nine students (55.1% females) participated the present study, including Grade 10 (50.1%) and Grade 11 (49.9%). They were recruited from 46 classes in two public high schools in southeast China. The mean parental education for fathers and mothers were 15.36 ($SD = 2.68$) and 14.98 ($SD = 2.64$), and they were positively related ($r = 0.72$, $p < 001$).

Regarding homework policy in these two schools, students were asked to develop a regular homework schedule and to complete required assignments on time, whereas parents were asked to help to provide and maintain a conducive studying environment, along with relevant resources (e.g., supplies and some basic reference books). Concerning math assignments, almost all of participants (97%) were assigned math homework five or more days weekly. On average, participants spent 67 min ($SD = 33$) doing math homework daily. The frequency and amount of math homework from the present investigation are similar to other homework research carried out in China (e.g., OECD, 2010).

The present investigation was a part of larger collaborative research