

Development of a measure of self-regulated practice behavior in skilled performers

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The purpose of this study was to develop and test the internal consistency of a self-report instrument for measuring self-regulatory behaviors in skilled performers during practice. 49 classically trained instrumentalists completed a web-based questionnaire designed to assess 5 hypothesized dimensions of self-regulation. Internal consistency was demonstrated through exploratory inter-item and item-total correlational tests. After suggested item deletions, reliability tests revealed that the sub-scales achieved good internal consistency.

Keywords: self-regulation; practice; skilled performers; questionnaire; internal consistency

Being able to guide one's own goal-directed activities across time and changing circumstances is of paramount relevance for the skilled performer. Commonly referred to as self-regulation, this competence includes the modulation of thoughts, feelings, and behaviors via deliberate or automated use of specific mechanisms and supportive meta-skills in order to pursue personal goals (Karoly 1993). The general psychological literature has stated that individuals with high levels of self-regulation benefit from a sense of psychological stability and personal control (Hoyle 2010). Effective self-regulation also improves wellbeing, and people who exert self-regulation typically have well-defined goals and adopt appropriate standards of behavior (Hoyle 2010).

Previous research has demonstrated how expert musicians are actively and meaningfully engaged in their own learning and performance processes (Williamon 2004, Chaffin *et al.* 2002, Hallam 1995a, 1995b). Skills improvement is attained through solitary deliberate practice (Ericsson *et al.* 1993), and salient qualitative properties of their practices (e.g. task analysis, goal setting, strategy choice, self-monitoring, and self-evaluation) have been recently studied as key components of self-regulation in music students

(McPherson and Zimmerman 2002, Austin and Berg 2006, Miksza 2012, Ritchie and Williamon 2013). The results of several studies have revealed that testimonials on self-regulation strategies have been presented as predictors of performance improvement. Students with high self-regulatory skills are more apt to manage technical and interpretation problems of a given work and to use mental strategies, showing organized practice behavior (McPherson 2005). Other positive correlations between self-regulatory skills and practice have been mentioned, including the good use of time in practice (Austin and Berg 2006), time spent in formal practice (McPherson and McCormick 1999, 2006), self-efficacy beliefs (McPherson and McCormick 2006, Ritchie and Williamon 2011), and use of cognitive and metacognitive strategies (Nielsen 1999).

As shown, self-regulation in music has been mainly used to understand the processes and methods of self-sufficient music learners. Nevertheless, few studies have researched self-regulation in skilled performers. We hypothesize that the levels of self-regulatory practice behaviors may correlate with the positive psychological states experienced by skilled performers during their practice processes and concerts. There is a need for the development of a valid and reliable instrument to measure self-regulatory behaviors in this context. This study aims to report a pilot of a new instrument for measuring the self-regulatory behaviors of skilled performers during practice, and to test the questionnaire's preliminary reliability using inter-item and item-total correlational tests and the Cronbach's alpha coefficient.

METHOD

Participants

The sample comprised 49 classically trained instrumentalists (male=52%, female=48%) from a Portuguese university, ranging in age from 18 to 58 years ($m=25.36$, $SD=7.87$). The musicians were engaged in undergraduate (41%) and graduate music performance degrees (masters=43%, PhD=16%). Their experience playing their instruments spanned from 5 to 52 years ($m=12.65$, $SD=7.48$). Among the instrumental categories investigated, strings represented the majority of respondents (45%). Other categories included woodwinds (25%), followed by keyboards, brass, and percussion (10% each).

Materials

The initial item pool consisted of 36 items designed to assess 5 self-regulatory dimensions: self-efficacy, goal orientation, goal setting, metacognition, and self-evaluation.

The self-efficacy scale was adapted to a musical context from Schwarzer and Jerusalem's (1995) General Self-Efficacy Scale, as it has demonstrated reliable psychometrics ($\alpha=0.80s$) and better adapted to expert, adult musicians. Participants responded to 10 items regarding their personal beliefs of competence to solve problems during practice. Minimal wording changes were made for the purposes of this study. For example, "I can always manage to solve difficult problems if I try hard enough" became "During practice, I can manage to solve difficult problems if I work hard enough."

The goal orientation scale comprised 5 items to assess learning and outcome orientations. Items assessing learning orientation such as "I practice with the main purpose of learning a great deal" contrast with outcome orientation items such as "It is important for me to prove that I am a good musician."

Self-regulated individuals tend to set specific and clear goals for an activity (Hoyle 2010). A 6-item scale was designed to assess the frequency of these behaviors (e.g. "I set specific practice goals") comprising the goal-setting sub-scale.

Metacognition was assessed through an adaptation of regulation of cognition items from Schraw and Dennison's Metacognitive Awareness Inventory (1994). The scale comprised 10 items assessing sub-processes that affect the control aspect of practice, such as notion of used strategies (e.g. "I find myself analyzing the usefulness of strategies while I am practicing"), time control (e.g. "I organize my time to practice to best accomplish my goals"), environment control (e.g. "I try to isolate/eliminate or minimize environment distractions for practice"), and social aspects (e.g. "I usually ask teachers or colleagues to listen to me playing").

Finally, self-evaluation was measured through 5 items assessing self-evaluation at the end of a practice session (e.g. "I ask myself how well I accomplish my goals once I'm finished").

Procedure

Respondents completed the online questionnaire from 28 November 2012 to 11 February 2013. For items comprising frequency of behavior, musicians indicated responses on 5-point Likert-type scales from 1 (never) to 5 (always). For items that required levels of agreement, musicians rated responses on 7-

point Likert-type scales from 1 (completely disagree) to 7 (completely agree). Statistical analyses were run with IBM SPSS 20 statistics software.

RESULTS

Exploratory inter-item and item-total analyses were conducted for each of the 5 hypothesized self-regulation subscales. The results suggested that deleting items from the self-efficacy (4 items), goal-orientation (1 item), goal setting (2 items), and metacognition (2 items) sub-scales would increase internal consistency. Following the removal of these items, analyses revealed that all inter-item correlations were significant ($p < 0.01$), and that all item-total correlations were $r = 0.30$ or greater.

Reliability coefficients and descriptive analyses for each subscale are presented in Table 1. The sub-scales had a moderate-to-high level of internal consistency, as determined by Cronbach's alpha reliability coefficients ($\alpha = 0.74$ to 0.86).

DISCUSSION

This study has developed a self-report measure of self-regulatory practice behaviors in skilled performers. The questionnaire was employed to measure underlying hypothesized dimensions of self-regulation relevant in the practice of skilled performers (self-efficacy, goal orientation, goal setting, metacognition, and self-evaluation). After deletion of items suggested by inter-item and item-total correlational tests, the five sub-scales achieved moderate-to-high internal consistency (Cronbach's α from 0.74 to 0.86).

Providing insight into the self-regulated behavior of skilled performers may help illuminate the impact of individual and demographic factors on approaches to practice. A reliable and valid measure of self-regulation in

Table 1. Means, standard deviations, and Cronbach's alpha overall reliability coefficients across the 5 hypothesized dimensions of self-regulatory practice behaviors of skilled musicians.

<i>Variable</i>	<i>Means</i>	<i>SD</i>	<i>Cronbach's α</i>
Self-efficacy (6 items)	30.42	6.29	0.86
Goal orientation (4 items)	19.35	5.41	0.80
Goal setting (4 items)	14.00	7.17	0.74
Metacognition (8 items)	25.76	5.36	0.81
Self-evaluation (5 items)	17.69	2.97	0.78

skilled performers may also be useful for correlational studies intending to investigate relationships between self-regulation and performance achievement, as well as with psychological states experienced by musicians (e.g. flow state).

Next steps in this research include the analysis of variances as a way to identify whether self-regulation may statistically correlate with demographic factors of the participants and the necessary analysis of the construct validity.

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