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RELATIONSHIP AMONG RESILIENCE, MENTAL HEALTH, AND COMPETITIVE PERFORMANCE IN JAPANESE ATHLETES: USING A SYNCHRONOUS EFFECTS MODEL TO EXAMINE RECURSIVE CAUSAL RELATIONSHIPS

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ABSTRACT

This longitudinal study considers the causal relationships found among resilience, mental health, and competitive performance in Japanese athletes. The participants included 63 Japanese university athletes (N = 63; male = 24, female = 39; mean age = 19.4, SD = 1.1), examined within three time periods. An analysis using a synchronous effects model found a positive impact on resilience of adjustment to athletic club activity and the self-evaluation of competitive performance; it also found a positive, two-way influence between self-esteem and resilience at Time 2. At Time 3, a positive influence was found of resilience on adjustment to athletic club activity and the self-evaluation of competitive performance, as well as a positive influence of self-esteem on resilience. These results suggest a recursive causal relationship, in which resilience increases mental health and competitive performance, and the acquisition of resilience is influenced in turn by the adjustment to athletic club activity, self-esteem, and the self-evaluation of competitive performance.
Keywords: *Resilience, recursive causal relationships, Japanese athletes.*

1. INTRODUCTION

Resilience has been defined as "the process of, capacity for, or outcome of successful adaptation despite challenging or threatening circumstances" (Masten, Best, & Garmezy, 1990); acquiring it is possible for all (Grotberg, 2003). Previous studies have shown that, among athletes, resilience contributes to the maintenance and promotion of mental health, growth as athletes, the improvement

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of competitive performance, and continuing in sport (e.g., Fletcher & Sarkar, 2012; Galli & Vealey, 2008; Holt & Dunn, 2004; Ueno & Oshio, 2015; Yi, Smith, & Vitaliano, 2005). While these studies have concluded that resilience has a definite effect on mental health and competitive performance, most have had a cross-sectional design and could not present sufficient evidence to make conclusions about causal relationships. Kumpfer (1999) divides the study design of resilience into five types: 1) retrospective single samples or cross-sectional studies, 2) retrospective cross-sectional and multivariate studies, 3) short-term transactional and longitudinal studies, 4) long-term development studies without control groups, and 5) long-term development studies with control groups. Oshio (2011) argues that of these, longitudinal studies are the most important for research into resilience. To support the development of training programs that can increase the resilience of athletes, studies should test its effects and work to understand how it is acquired, from a longitudinal perspective.

A principal theme in scientific research is the discovery of causal laws between variables, with the goal that this knowledge be applied in effective clinical, competitive, and training interventions. According to Menard (1991) and Takahira, Ando and Sakamoto (2006), three conditions must be met for it to be demonstrated that variable X is a cause of variable Y: 1) that X and Y covariate, 2) that X temporally precedes Y, and 3) that the relationship between X and Y is not spurious. Negative relationships between resilience and burnout or stress response and positive relationships between adjustment to athletic club activity and self-esteem or self-evaluation of competitive performance have been reported in studies of Japanese athletes (e.g., Ueno & Amemiya, 2015; Ueno & Oshio, 2015; Ueno & Shimizu, 2012; Ueno & Suzuki, 2015, 2017). These findings are based on cross-sectional studies that simultaneously measure variables that are set up as cause and effect, so the directionality among them cannot be judged to be more than postulation. That is, even if the direction of a path is reversed on an inter-variable analysis, there is no change in the significance or value of the path or the goodness of fit index for the model (or an equivalent model) (Stelzl, 1986; Tomarken & Waller, 2003). One criticism of cross-sectional studies is that causal models based on logical hypotheses may not prove the existence of casual relationships, in the sense that these are understood in the natural sciences. By contrast, longitudinal studies allow for conditions 1 and 2 of causal relationships to be met at the same time, so that inter-variable relationships can be inferred with a degree of certainty without having recourse to any prior manipulation of the variables (Takahira *et al.*, 2006). Further, considering that the temporal priority of a causal variable is an essential condition for any causal inference (Kano, 2002), longitudinal studies provide an effective method for inferring inter-variable causal

relationships, due to their ability to measure causal variables in advance, before the operation of their effects.

Thus, a longitudinal perspective is essential for the examination of causality as it relates to how athlete resilience contributes to their mental health and competitive performance. In this study of Japanese athletes, we provided a longitudinal view of the relationship among resilience, mental health, and competitive performance. Similar to previous studies that used cross-sectional data on resilience among Japanese athletes (Ueno & Amemiya, 2015; Ueno & Oshio, 2015; Ueno & Suzuki, 2017), we used the following variables: adjustment to the activities of athletic clubs, self-esteem, and self-evaluation of competitive performance (used here as an index to measure both mental health and competitive performance). After a 6-month prospective cohort study, we conducted three surveys (at approximately 3-month intervals). Data from three points in time or more allow for the inference of inter-variable causal relationships, with an added degree of flexibility and stability (e.g., variable X [first time] to variable Y [second time] to variable Z [third time]); for reference, see Finkel, 1995; Shimamoto & Ishi, 2010; Omi, Sakamato, Ando, Akiyama, Kimura, Kashibuchi, Naito, Takahira, Sakamoto, Adachi, Suzuki, Kato, & Sakamoto, 2005; Takahira *et al.*, 2006). While the temporal priority of the causal variable is a necessary condition for the inference of causality (Kano, 2002), it may nevertheless not be possible to identify the existence of an influence if the period between the initial and follow-on studies is longer (or shorter) than the time it takes to discover the causal relationship (Okabayashi, 2006). This problem is addressed using a synchronous effects model (Takahira *et al.*, 2006), which provides a way to simultaneously infer two-way effects between variables, based on longitudinal data. We used this model in our analysis of causal relationships among athletes' resilience, mental health, and competitive performance because it allowed us to examine the relationship between two variables at the same point in time and use longitudinal data to simultaneously infer two-way effects (Finkel, 1995).

2. METHODS AND MATERIALS

2.1 Participants and the Period of Study

This study was conducted during 2014, over three time periods: from mid-April to mid-May (Time 1), from mid-July to mid-August (Time 2), and from mid-October to mid-November (Time 3). The participants were Japanese university students (N = 63; male = 24, female = 39; mean age = 19.4 years, SD = 1.1) participating in athletic clubs at different universities in Tokyo, Kanagawa, and

Hyogo prefectures. All subjects belonged to competitive clubs in individual or team sports that competed in international, national, and regional events.

2.2 Procedures

This study, including its purpose, confidentiality, and ethical considerations, was explained in detail to the participants before the beginning of the study. Investigator explained that the survey data would be collected anonymously, that participation was voluntary, and that the subjects would not suffer consequences for not participating. The study was only conducted after the approval of the ethics committee of the institution where the first author was formerly affiliated was obtained.

2.3 Measurements

2.3.1 Resilience: Investigator used internal factors from the Psychological Resilience Scale for University Athletes (Ueno & Shimizu, 2012). The scale is composed of 16 items in four subscales, namely, "Athletic Motivation and Challenge (e.g., I like being challenged by new plays)," "Athletic Mental Toughness (e.g., I don't get depressed even if I lose a game)," "Athletic Self-Understanding (e.g., I understand my strong and weak points as an athlete),"and "Athletic Physical Toughness (e.g., I can endure physical pain and fatigue)." The reliability and validity of this scale has been confirmed. Following Ueno and Suzuki (2016), our analysis relies on the total scores from these four sub-scales. Responses were solicited on a five-point scale from "No (1 point)" to "Yes (5 points)." A higher score indicates a greater resilience in the participating athlete.

2.3.2 Adjustment to athletic club activity: Investigator took two items measuring overall adjustment from the Adjustment to Club Activity Scale, developed by Katsura and Nakagomi (1990). The items were "Since joining my current club, my athletic life has been very good overall" and "I think my athletic life will continue to be very good overall in the future"; the reliability and validity of these items have been confirmed. Responses were solicited on a seven-point scale from "totally disagree (1 point)" to "totally agree (7 points)." A higher score on this scale indicates a greater degree of adjustment to athletic club activity.

2.3.3 Self-esteem: Investigator used Sakurai's (2000) Japanese version of Rosenberg's Self-esteem Scale. This scale is composed of 10 items, including "On the whole, I am satisfied with myself," "I am able to do things as well as most other people," "I feel that I'm a person of worth, at least on an equal plane

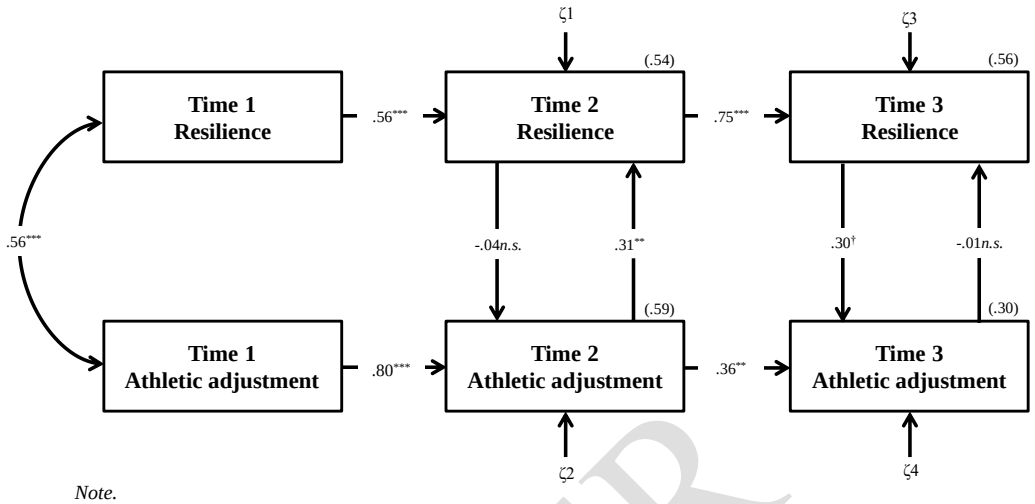
with others," and "I take a positive attitude toward myself"; its reliability and validity have been confirmed. Responses were solicited on a four-point scale from "disagree (1 point)" to "agree (4 points)." A higher score on this scale indicates a greater degree of self-esteem.

2.3.4 Self-evaluation of competitive performance: Investigator used Ueno and Oshio's (2016) Self-evaluation of Competitive Performance Questionnaire. This scale contains three items: "I am confident about my competitive abilities," "I am satisfied with my performance," and "I am happy with my results in competitions" and their reliability and validity have been confirmed. Responses were solicited on an 11-point scale from "strongly disagree (0 points)" to "strongly agree (10 points)." A higher score on this scale indicates a better self-evaluation of competitive performance.

3. RESULTS

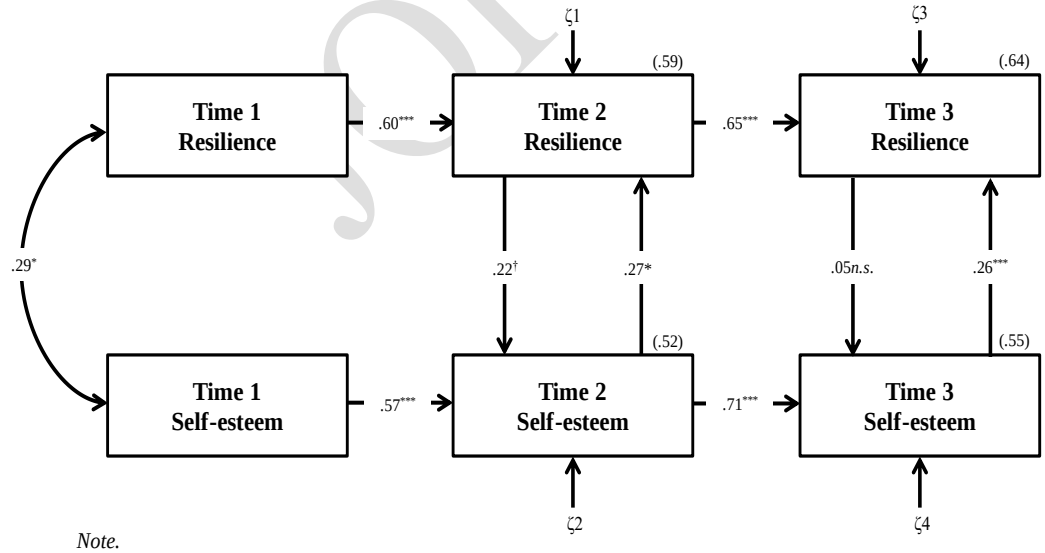
For the purposes of this study, data analysis was conducted using IBM SPSS Statistics Ver.20.0 and IBM Amos Ver.20.0 statistical analytical software. Pearson correlation coefficients (r) for resilience and inter-variables were calculated to fall within r = -0.59–0.53, showing significance at the 5% to 0.1% levels and marginal significance at a 10% level. Moreover, in accordance with the model established in our hypothesis, synchronous effects modeling using a covariance structure analysis resulted in the following goodness of fit indices: GFI = 0.94, CFI = 0.96, and AIC = 43.33 for adjustment to athletic club activity, GFI = 0.93, CFI = 0.96, and AIC = 43.54 for self-esteem, and GFI = 0.95, CFI = 0.97, and AIC = 41.50 for the self-evaluation of competitive performance (Figure 1, 2, 3). For adjustment to athletic club activity, a significant positive path to resilience was found, from adjustment to athletic club activity to resilience in Time 2 (β = 0.31, p < 0.01), and a marginally significant positive path was found from Time3 resilience to Time 3 adjustment to athletic club activity (β = 0.30, p < .10). For self-esteem, there was a two-way significant positive path and a marginally significant positive path between resilience and self-esteem in Time 2 (β = 0.27, p < 0.05; β = 0.22, p < 0.10) and a significant path to Time 3 resilience from Time 3 self-esteem (β = 0.26, p < 0.001). There was a significant positive path from self-evaluation of competitive performance, to Time 2 resilience from Time 2 self-evaluation of competitive performance (β = 0.46, p < 0.001), and a significant positive path to self-evaluation of competitive performance, to Time 3 self-evaluation of competitive performance from Time 3 resilience (β = 0.34, p < 0.01).

Figure 1: Results of synchronous effects model of adjustment to athletic club activity



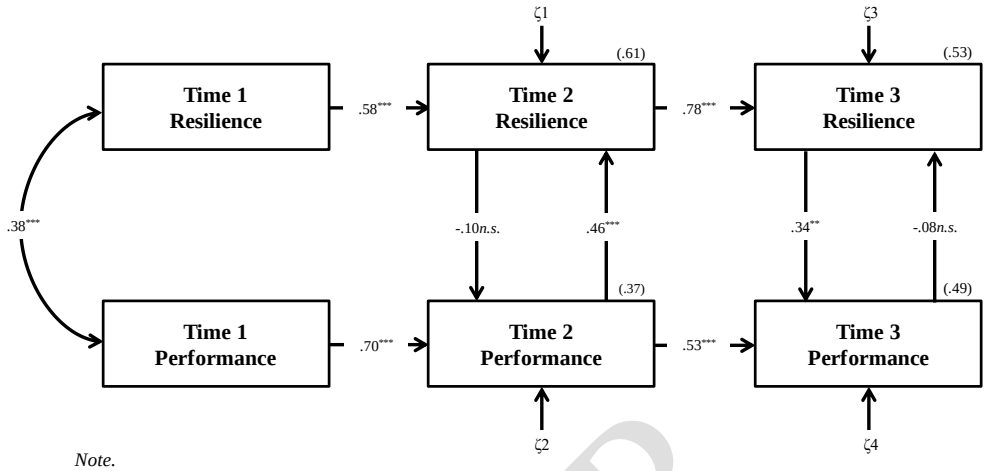
Note.
Athletic adjustment: Adjustment to athletic club activity
Numerical values express standardized estimates and value in parentheses is the coefficient of determination.
ξ1—ξ4: Error variables
$^{\dagger}p<.10$, $^{**}p<.01$, $^{***}p<.001$
Model fit indices: GFI = .94, CFI = .96, AIC = 43.33

Figure 2: Results of synchronous effects model of self-esteem



Note.
Numerical values express standardized estimates and value in parentheses is the coefficient of determination.
ξ1—ξ4: Error variables
$^{\dagger}p<.10$, $^{*}p<.05$, $^{***}p<.001$
Model fit indices : GFI = .93, CFI = .96, AIC = 43.54

Figure 3: Results of synchronous effects model of self-evaluation of competitive performance



Note.
Performance: Self-evaluation of competitive performance
Numerical values express standardized estimates and value in parentheses is the coefficient of determination.
ξ1—ξ4: Error variables
$^{**}p<.01$, $^{***}p<.001$
Model fit indices : GFI = .95, CFI = .97, AIC = 41.50

4. DISCUSSION

The results of this study suggest that, depending on the time of year, the directions of the inter-variable paths of influence among the factors of resilience, adjustment to athletic club activity, self-esteem, and self-evaluation of competitive performance vary. For example, in the synchronous effects model, which used adjustment to athletic club activity, there was a positive influence of adjustment to athletic club activity on resilience in Time 2, while there was a positive influence of resilience on adjustment to athletic club activity in Time 3. There was a two-way positive influence between resilience and self-esteem in Time 2 and a positive influence of self-esteem on resilience in Time 3. There was a positive influence of self-evaluation of competitive performance on resilience in Time 2 and a positive influence of resilience on self-evaluation of competitive performance in Time 3. Our results corroborate the findings of previous studies (e.g., Ueno & Amemiya, 2015; Ueno & Oshio, 2015; Ueno & Shimizu, 2012; Ueno & Suzuki, 2015, 2017), suggesting that not only is there a unilateral influence of resilience on mental health and competitive performance, but there are also influences of these factors back onto resilience. Indicators such as mental health, emotions, daily living environment, competitive environment, and competitive performance have been reported to predict resilience (e.g., Fletcher & Sarkar, 2016; Lepore & Revenson, 2006; Oshio, Nakaya, Kaneko, & Nagamine,

2002; Sarkar & Fletcher, 2016; Shibukura, 2012; Shimamoto, Ueno, & Suzuki, 2017; Tugade & Fredrickson, 2007) and may play an important role in how resilience is acquired among athletes. At the very least, we can conclude that there should be a recursive model of mutual influence, a finding that is in contrast to past analyses, which have treated resilience as an independent variable in a one-directional causal relationship with mental health and competitive performance as dependent variables. Similar findings to ours have not been reported in previous cross-sectional studies, and thus our results may provide important insights into the relationships among resilience, mental health, and competitive performance among athletes.

Based on our findings and those of previous studies, we can surmise that resilience and the variables adjustment to athletic club activity, self-esteem, and the self-evaluation of competitive performance are mutually related and that training approaches should vary within the competitive season, depending on the time. For example, in Japan, unlike in other countries, April marks the start of the new fiscal and academic years and brings major changes to both the individual environment and the composition of teams. Psychological pressures may also vary predictably in the on and off seasons. For Japanese athletes, the provision of intervention programs in April or May to promote adjustment to athletic club activity, self-esteem, and competitive performance would lead to greater resilience before the months of July and August, in which athletes are burnout prone (Ueno & Suzuki, 2016); thereby, burnout could be prevented from occurring. It would then follow that after August, resilience would contribute to better mental health and competitive performance. Due to the possible presence of cultural bias in this study, further research must be conducted on the athletes of various other countries during controlled periods of time. Finally, in addition to the evidence that has accumulated from previous cross-sectional studies, our findings may also contribute by providing coaches with an important perspective on team management and athletic training, based on an understanding of the relationships among resilience, mental health, and competitive performance.

5. CONCLUSION

The findings in this study suggest that the direction of causality in inter-variable relationships among athlete resilience, adjustment to athletic club activity, self-esteem, and the self-evaluation of competitive performance will vary, depending on the time period. That is, while resilience has positive effects on mental health and competitive performance, adjustment to athletic club activity, self-esteem, and the self-evaluation of competitive performance also influence the acquisition of resilience in recursive causal relationships. Our results should be interpreted

with caution, due to their small sample size and insufficient statistical values, but they can provide a basis for study designs for interventions and a more detailed examination of the causal relationships among resilience, mental health, and competitive performance.

6. ACKNOWLEDGEMENT

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