

Relationships Between Throwing Yips in Baseball, Experiential Avoidance, Cognitive Fusion, Values, and Social Factors

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Despite the high prevalence of yips, a psychoneuromuscular impairment affecting fine motor skills in sports performance, the specific aspects of its causality and treatment have not been identified or verified. This cross-sectional study examined psychosocial factors relating to throwing yips in baseball. Amateur baseball players ($N = 292$) living in Japan completed a self-report questionnaire on their anxiety/fear about throwing the ball, the Acceptance and Action Questionnaire-II, the Cognitive Fusion Questionnaire, the Short Fear of Negative Evaluation Scale, and self-reports evaluating values and social factors relevant to baseball. A hierarchical multiple regression analysis indicated that a low values-based throwing score, a high Cognitive Fusion Questionnaire score, and overreprimanding others' mistakes were positively associated with baseball players' yips symptoms. These results suggest that changing the context of playing baseball, reducing cognitive fusion, and improving coaching methods could reduce the risk of baseball players' throwing yips.

Keywords: acceptance and commitment therapy, mindfulness–acceptance–commitment approach, psychological flexibility, sport performance

Yips is “a psychoneuromuscular impediment affecting the execution of fine motor skills during sporting performance” (Clarke et al., 2015), which is a longstanding problem in many sports. For example, the yips manifest as a nervous response of the wrists before or upon contact with the ball in golf (Smith et al., 2000), causing a jerky motion and derailing putts (Smith et al., 2003). The yips have also been reported in baseball (Papineau, 2015), tennis (Mayer et al., 1999), shooting (Sitburana & Ondo, 2008), table tennis (Le Floch et al., 2010), and cricket (Bawden & Maynard, 2001). In Japan, 42% of middle school baseball players (Kagawa & Fukae, 2013) and 47% of college baseball players have experienced the tendency to suffer from throwing yips (Aoyama et al., 2021). Moreover,

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Aoyama et al. (2021) reported that of the players who experienced throwing yips symptoms; 79% stated, “I cannot throw it where I want it”; 63% stated, “The ball will not leave my hand”; 48% stated, “I am hitting the ball into the ground”; 58% stated, “The ball does not reach the receiver”; and 56% stated, “The ball goes over the sender’s head.” Furthermore, 40.4% of players tended to have more yips symptoms under pressure, such as during games. The yips are called “career killers” in sports (Smith et al., 2003) because they deteriorate performance and lead to reduced playing time or athletes’ early retirement (Hersh, 2016; Smith et al., 2003).

Literature Review of the Yips

Several studies in fields such as sport psychology have examined the yips. The yips are classified into three types based on the symptoms experienced. Type I yips (focal dystonia) include physical (e.g., jerking, freezing, and tremoring) symptoms. Type II yips (choking; Smith et al., 2003) include psychological symptoms (nervousness and lack of confidence). Moreover, Types I and II combined yips have also been reported (Type III; Clarke et al., 2015). Types I and II yips are related to performance anxiety (Smith et al., 2003). Quantitative studies demonstrated that yips-affected golf, darts, and cricket players who exhibit higher perfectionism scores (personal standards, organization, and concern over mistakes) than other players (Roberts et al., 2013). Clarke et al. (2020) reported that choking affected golfers, and archers have higher scores for perfectionism subfactors, anxiety subfactors, and interpersonal factors. Moreover, self-consciousness and trait anxiety were positively associated with Type II “choking” yips (Wang et al., 2004). Furthermore, Type I yips are related to rumination, perfectionism, and concerns about making mistakes (Bennett et al., 2016). Other possible variables associated with throwing yips might include childhood trauma (Grand & Goldberg, 2011), nervous system and brainwave abnormalities (Watanabe et al., 2021), and coaches’ pressure (Sato, 2017). However, Clarke et al. (2015) indicated that there are only a few studies on the yips that have resulted in theory-based treatment methods.

The psychological characteristics of Types I and II yips include anxiety and fear of failure. Moreover, one behavioral characteristic of yips includes poor performance (Smith et al., 2003). This study focused on the psychological and behavioral characteristics of throwing yips in baseball that we defined as the yips symptoms.

Current Yips Treatments

Despite its high prevalence, no appropriate treatments have been established for yips. Moreover, only one systematic study has reviewed the efficacy of yips interventions in sports (Mine et al., 2018). Mine et al. selected 12 case studies using the following keywords: “Yips,” “Dystonia,” OR “Choking,” AND “Sports,” “Athlete,” “Player,” “Golf,” OR “Baseball.” They excluded studies on focal dystonia, such as studies on musicians and writers, among other populations, and reviewed English or Japanese articles on the effects of yips symptom management. The results indicated that 12 studies demonstrated limited evidence

that image training, listening to music, cognitive reconstructing, relaxation training, educating teammates, preperformance routines, positive instructional self-talk during shots, and breathing exercises were efficacious treatments for the yips. According to Mine et al. (2018), motor imagery or solution-focused guided imagery (SFGI) showed moderate-to-large effect sizes on Type I yips. Moreover, SFGI implemented with golfers showed an improvement in symptoms associated with the yips. However, the 60-day follow-up revealed recurrences, and continuous implementation of SFGI was recommended (Bell & Thompson, 2007). Furthermore, systematic reviews have suggested that the efficacy of yips interventions remains inconclusive (Mine et al., 2018). Moore (2009) mentioned the limitations of psychological skills training using traditional cognitive techniques to control internal processes such as thoughts, emotions, and sensations to improve sports performance (see also Hardy et al., 1996). Therefore, traditional psychological skills training, including cognitive restructuring, imagery training, and SFGI, might have undesirable consequences when used to treat yips symptoms.

Yips and Psychotherapy Theories: Psychological In/Flexibility Model

Acceptance and commitment therapy (ACT) is a cognitive-behavioral therapy that uses acceptance, mindfulness, commitment, and behavioral activation processes to foster psychological flexibility (Hayes et al., 2012). ACT effectively treats chronic pain, mixed anxiety disorder, depression, and obsessive-compulsive disorder (Society of Clinical Psychology, Division 12 of the American Psychology Association, 2016). In sports, there is a growing interest in improving performance by incorporating elements of mindfulness, acceptance, and values in the mindfulness-acceptance-commitment approach (Gardner & Moore, 2004). ACT assumes six core processes commonly associated with psychopathology (experiential avoidance, cognitive fusion, inflexible attention, attachment to the conceptualized self, disruption of values, and inactions), which we have termed the psychological inflexibility model. In contrast, the psychological flexibility model of human functioning and behavioral change has components, including acceptance, defusion, flexible attention to the present moment, self-as-context, values, and committed action, which correspond to the psychological inflexibility model's core processes. ACT supports clients by replacing the state of psychological inflexibility with psychological flexibility (Hayes et al., 2012).

From the viewpoint of ACT, yips-affected players often report behaviors that could be interpreted as experiential avoidance, including the desire to escape, avoiding throwing the ball for fear of failure or being seen as incompetent (Bawden & Maynard, 2001), and exhibiting perfectionistic tendencies (Clarke et al., 2020). Experiential avoidance is a process within the psychological inflexibility model of ACT, defined as “the phenomenon that occurs when a person is unwilling to remain in contact with a particularly private experience (e.g., bodily, sensation, emotions, thoughts, memories, and behavioral predispositions) and takes steps to alter the form or frequency of these events and the context that occasions them” (Hayes et al., 1996, p. 1154). Experiential avoidance is not always inappropriate and has been associated with psychopathology (e.g., lower levels of experiential avoidance and anxiety assessed by the Hospital Anxiety and Depression Scale—

anxiety subscale [$r = -.60$], and depression assessed by the Center for Epidemiologic Studies Depression Scale [$r = -.47$]; [Fledderus et al., 2010](#)). According to [Ong et al. \(2019\)](#), “from an ACT perspective, perfectionism is conceptualized as an experiential avoidance to unwanted inner experiences (e.g., procrastinating to avoid feeling overwhelmed, overworking to dispel thoughts like ‘I am not good enough’) and overregulation of behavior by rules” (p. 2).

Yips-affected athletes also experience negative cognitive phenomena alongside engagement, performance, and self-consciousness ([Wang et al., 2004](#)), which include ruminations and concern about mistakes ([Bennett et al., 2016](#)). They also experience cognitive anxiety, including “negative thoughts about other people,” panic, including “needing to escape,” and thoughts such as “the negative train of thought is never far away, even [during] practice” ([Bawden & Maynard, 2001](#)). Therefore, the yips involve experiential avoidance and high cognitive fusion, which is a process in the psychological inflexibility model of ACT that is defined as “when behavior is inflexible and influenced more by verbal networks than by experienced environmental consequences” ([Bach & Moran, 2008](#), p. 97). Cognitive fusion is related to psychopathology (e.g., generalized anxiety and obsessive–compulsive disorder; [Faustino et al., 2023](#)). ACT is an effective treatment that decreases experiential avoidance and cognitive fusion. However, no studies have examined the relationship between the yips and experiential avoidance or cognitive fusion.

We conducted a pilot study to investigate the application of the psychological flexibility model’s values to yips. [Wilson \(2009\)](#) stated that in ACT, values are defined as “freely chosen, verbally constructed consequences of ongoing, dynamic, evolving patterns of activity, which establish predominant reinforcers for that activity that are intrinsic in engagement in the valued behavioral pattern itself” (p. 66). Values can motivate behavior ([Hayes et al., 1999](#), p. 204) and actions that provide a sense of meaning ([Dahl et al., 2009](#)). Demonstrating an association between the psychological inflexibility model of ACT and the yips would help to establish ACT for psychologically supporting yips-affected players.

Study Purpose

We quantitatively examine the association of experiential avoidance, cognitive fusion, values, and social factors with throwing yips in baseball using a self-report questionnaire. We included social factors as independent variables because clinical practice should broadly consider the impacts of social and environmental factors, including pressure from coaches ([Sato, 2017](#)) on the yips. This is the first study on this topic, and its objective was to obtain broad findings. Therefore, we conducted the study without clearly dividing the yips into Types I and II.

Hypothesis Development

We developed the following hypotheses: (a) Experiential avoidance and cognitive fusion are positively associated with yips symptoms, (b) low values-based throwing scores are positively associated with yips symptoms, and (c) social factors are also positively associated with yips symptoms.

Methods

Participants

Junior high school, high school, university, and (amateur) community baseball players in Japan ($N = 292$, 278 men and 14 women, mean age = 23.15, $SD = 7.53$) completed the questionnaires. We sent a Google Form with the survey items to each team. The authors also asked their baseball acquaintances to complete the questionnaires. The survey period was from July 4 to December 2, 2021. An a priori analysis was conducted using G*power analysis (version 3.1; [Faul et al., 2007](#)), which indicated that a sample size of 114 was needed to detect the model's significance at $\alpha = .05$, power ($1 - \beta$ error probability) = 0.80, effect size $f^2 = 0.15$ (medium), with the number of predictors = 9. Therefore, this study's sample size of 292 people was sufficient. Coaches and supervisors could see the forms used in this study but could not view the study's results.

Ethical Considerations

This research was approved by Waseda University's Ethics Review Committee on Research with Human Subjects. All the participants provided their informed written consent to participate. In addition, before answering the questionnaire, the participants were informed that the study results would be used for research purposes only and that no individual would be identified.

Measures

Predictor Variables

Acceptance and Action Questionnaire-II. The Acceptance and Action Questionnaire-II (AAQ-II) is a general measure of experiential avoidance consisting of seven items rated on a 7-point Likert scale ranging between 1 (*never true*) and 7 (*always true*) with high scores indicating high experiential avoidance. The AAQ-II has adequate reliability and validity ([Bond et al., 2011](#)). Moreover, the Japanese version ([Shima et al., 2013](#)) has a one-factor structure with good internal consistency (Cronbach's $\alpha = .88$). Its concurrent validity was examined with the Rumination–Reflection Questionnaire ($r = .60$), Penn State Worry Questionnaire ($r = .64$), and Behavioral Activation for Depression Scale ($r = -.52$).

Cognitive Fusion Questionnaire. The Cognitive Fusion Questionnaire (CFQ) is a general measure of cognitive fusion with 13 items rated on a 7-point Likert scale ranging between 1 (*never true*) and 7 (*always true*). The original version of the CFQ ([Gillanders et al., 2014](#)) and the Japanese version ([Shima et al., 2016](#)) have good psychometric properties. Of the 13 items, nine measure cognitive fusion, and four measure deffusion. According to Shima et al. (2016), these two factors should be treated separately. Therefore, we only used the fusion items in which high scores indicate high cognitive fusion. The nine fusion items of the Japanese CFQ have demonstrated good internal consistency (Cronbach's $\alpha = .92$; [Shima et al., 2016](#)). Its concurrent validity has been examined with the

Rumination–Reflection Questionnaire ($r = .75$), Penn State Worry Questionnaire ($r = .74$), AAQ-II ($r = .67$), Five-Facet Mindfulness Questionnaire with Observation ($r = -.25$), and Cognitive Control Scale with Mitigation of Catastrophic Thinking ($r = -.19$).

Values-Based Throwing. We developed three simple items to assess whether baseball and the act of throwing a ball are based on values. According to Dahl et al. (2009), values are “what motivates us, what we find reinforcing, or what we work toward gaining, rather than what we are escaping from or avoiding” (p. 6). Hence, values are defined as positive rather than negative reinforcements (Dahl et al., 2009). Moreover, values are complex, differ between individuals, and cannot be simply assessed. Nevertheless, we developed the following items for preliminary assessment by considering the positive and negative reinforcement framework of values described by Dahl et al. (2009), after discussing the items with the second author, a PhD holder with a clinical psychology license, who has experience in developing ACT scales, and knowledge about sports.

The participants rated the three items on a 7-point Likert scale ranging between 1 (*never true*) and 7 (*always true*). The items were (a) *Do you feel that you enjoy baseball?* (positive reinforcement), (b) *When a throw goes well, I feel glad that I did not fail* (negative reinforcement), and (c) *When a throw goes well, I feel enjoyment in the play itself* (positive reinforcement). High scores for item (b) indicate less values-based throwing.

Social Factors. We assessed social factors relevant to baseball as a supplementary assessment because environmental approaches are essential for supporting people with the yips. Sato (2017) pointed out that pressure from others might also have positively associated with yips. Therefore, we developed the following three items: (a) *At baseball practice, I am often reprimanded by my coach, supervisor, or teammates.* This item was rated using a 7-point rating scale ranging between 1 (*not applicable*) and 7 (*extremely applicable*), and (b) *Are there any penalties for baseball errors (e.g., mistakes or losing a game)? (Penalties include intense training such as pushing tires and sprinting between poles).* This item was rated using a 7-point rating scale ranging between 1 (*no*) and 7 (*many*), and (c) *How hard is it to become a regular?* This item was rated using a 7-point rating scale ranging between 1 (*not tough at all*) and 7 (*extremely tough*). We developed these items in consultation with the second author.

Short Fear of Negative Evaluation Scale. The Short Fear of Negative Evaluation Scale (SFNE) is a general measure of the fear of negative evaluations consisting of 12 items rated on a 5-point Likert scale ranging between 1 (*strongly disagree*) and 5 (*strongly agree*). High scores on the SFNE indicate a high fear of negative evaluation. The Japanese SFNE (Sasagawa et al., 2004) is widely used to assess social anxiety and has good reliability and validity (Nihei et al., 2018). Nihei et al. (2018) recommended using only the eight forward items (not the four reverse items) to ensure reliability, and we calculated the score with these items. These eight items with adequate internal consistency (Cronbach’s $\alpha = .94$) and adequate test–retest reliability (intraclass correlation coefficient = $.93$, 95% confidence interval [$.89$, $.95$]; Nihei et al., 2018) constituted the first factor of this study. Moreover, the SFNE has demonstrated associations with the Liebowitz Social

Anxiety Scale-Fear ($r = .40$), Liebowitz Social Anxiety Scale-Avoidance ($r = .28$), and Generalized Anxiety Disorder Questionnaire for DSM-IV ($r = .51$). We used scale as a control variable.

Outcome Variables

Psychological Measure of the Yips: Throwing Disability Scale. This scale measures anxiety and fear around throwing errors using 15 items rated on a 4-point Likert scale ranging between 1 (*never*) and 4 (*very often*) (Kagawa & Fukae, 2013). High Throwing Disability Scale scores indicate high anxiety and fear around throwing errors. Kagawa and Fukae (2013) investigated the prevalence of throwing yips in junior high school baseball players using the items such as “anxiety in critical situations” and “nervousness caused by imagining a wild pitch.” This study adopted subjective anxiety and nervousness relating to throwing errors as yips indicators. This scale consists of five factors with confirmed validity and reliability for the *sense of high strain caused by wild pitch image* (Cronbach’s $\alpha = .82$, test–retest reliability: $r = .83$), *excessive consciousness toward others’ evaluation* (Cronbach’s $\alpha = .76$, test–retest reliability: $r = .86$), *excessive consciousness toward seniority* (Cronbach’s $\alpha = .71$, test–retest reliability: $r = .84$), *the sense of inferiority* (Cronbach’s $\alpha = .83$, test–retest reliability: $r = .68$), *excessive consciousness toward critical situations* (Cronbach’s $\alpha = .73$, test–retest reliability: $r = .82$), and overall score (Cronbach’s $\alpha = .89$, test–retest reliability: $r = .87$). In Japan, this scale is often used to measure yips symptoms. Moreover, the Throwing Disability Scale is positively correlated with the Japanese version of the Trait Anxiety Inventory for Sport: the sense of high strain caused by wild pitch image, $r = .49$; excessive consciousness toward others’ evaluation, $r = .55$; excessive consciousness toward seniority, $r = .35$; the sense of inferiority, $r = .52$; and excessive consciousness toward critical situations, $r = .66$. The items of this scale are shown in the Appendix File (https://osf.io/fwc4z/?view_only=5f10c01783304eaeac1e2190a564e127).

Behavioral Measures of the Yips. The frequency of throwing errors caused by the yips was measured by the following items assessing throwing over a short (≤ 27 m) and a long distance (≥ 27 m). *In baseball games, how many times out of 10 throws do you experience a throwing error caused by anxiety or nervousness? (Throwing errors, in this case, indicate the inability to throw the ball accurately. For example, you try to throw the ball at someone’s chest, but it goes in a different direction.)* Aoyama et al. (2021) reported that 50% of players with moderate or more severe throwing yips symptoms had yips experienced for throws of 20 m or less, 32.6% for throws from 20 to 27 m, and 8.1% for throws longer than 50 m. Moreover, the frequency of the yips decreased as the distance of the throw increased. Therefore, this study measured the frequency of mistakes when throwing short distances that were shorter than the distance between bases and long distances that were longer than the distance between bases as indicators of yips.

Data Analysis

Descriptive statistics, Pearson’s correlations and hierarchical multiple regression analyses were conducted using IBM SPSS (version 27). The hierarchical multiple

regression analysis was conducted with the respective yips scale scores as dependent variables, AAQ-II, CFQ, and values-based throwing, and social factors as independent variables, and the SFNE as the control variable. The fear of negative evaluation is often reported to be associated with the yips. As we were interested in the predictive power of cognitive fusion and experiential avoidance after controlling for fear of negative evaluation, we entered the fear of negative evaluation as a control variable in Step 1. In Step 2, we investigated the effects of experiential avoidance and cognitive fusion on yips symptoms. In Step 3, we entered our supplementary index of values-based throwing and social factors to identify the variables that affect yips symptoms.

We visually confirmed all the variables using normal quantile–quantile plots before interpreting the results of the hierarchical multiple regression analysis. The data satisfied the normal distribution requirement, as the plot graphs formed a nearly straight line. The normal quantile–quantile plots for throwing error frequency (≤ 27 m), throwing error frequency (≥ 27 m), enjoying baseball score, and feeling glad about not failing score were less straight. We log-transformed these four variables, but enjoying baseball score and feeling glad about not failing score lowered the normal quantile–quantile plot line. In addition, the hierarchical multiple regression analyses' model fit was worse with the log-transformed throwing error frequencies (≤ 27 m and ≥ 27 m) as the dependent variables. Therefore, we used the raw data of these four variables without log transformation.

All of the regression model's predictors indicated that multicollinearity would not hamper our ability to interpret the hierarchical multiple regression analysis ($VIF < 10$). The normal (probability) standardized residuals' regression plots were located in a nearly straight line. The Cook's distance score was suitable, and the maximum Mahalanobis distance (49.14) was above the critical χ^2 for $df = 8$ (at $\alpha = .001$) of 26.16. However, we did not treat the outliers in this study because we assumed a continuum of yips symptoms and that data characteristics would be lost by excluding the outliers.

Results

Table 1 summarizes the participants' demographic characteristics. Table 2 presents means and standard deviations of the variables. We calculated Pearson's product–moment correlation coefficients to examine the correlations between the variables (Table 3). The AAQ-II, CFQ, SFNE, feeling glad about not failing, and being reprimanded by others showed moderate positive correlations with the overall score of the Throwing Disability Scale score. We conducted a hierarchical multiple regression analysis to evaluate the predictive power of the Throwing Disability Scale's factors on the SFNE, AAQ-II, CFQ, values-based throwing, and social factors (Table 4).

Sense of High Strain Caused by Wild Pitch Images

The SFNE accounted for a significant 9.6% of the variance in Step 1, adjusted $R^2 = .09$, $F(1, 290) = 30.73$, and $p < .001$. We added the AAQ-II and CFQ into the

Table 1 Demographic Data (N = 292)

	<i>n</i>	%
Sex		
Men	278	95.2
Women	14	4.8
Other	0	0.0
Age (years)		
14–19	104	35.6
20–29	150	51.4
30–39	24	8.2
40–49	8	2.7
50–57	6	2.1
Affiliation		
Junior high school student	3	1.0
High school student	38	13.0
Undergraduate student	151	51.7
Graduate student	2	0.7
Technical school student	1	0.3
Member of society	90	30.8
Other	7	2.4
Years of baseball experience		
1–4	15	5.1
5–9	63	21.6
10–14	150	51.4
15–19	37	12.7
20–24	11	3.8
25–29	8	2.7
30–34	2	0.7
35–40	6	2.1
Baseball position		
Pitcher	64	21.9
Catcher	21	7.2
First baseman	25	8.6
Second baseman	34	11.6
Third baseman	36	12.3
Shortstop	34	11.6
Left fielder	18	6.2
Center fielder	37	12.7
Right fielder	23	7.9

(continued)

Table 1 (continued)

	<i>n</i>	%
Position in team		
Starter	148	50.7
Second team	68	23.3
Third team	25	8.6
Fourth team	12	4.1
Fifth team or more	39	13.4
Played a baseball game within the past month		
Yes	151	51.7
No	141	48.3

regression equation in Step 2, which accounted for an additional 6.5% of the variance, adjusted $R^2 = .15$, $F(3, 288) = 0.42$, and $p < .001$. In Step 3, the sense of high strain caused by wild pitch images was positively associated with feeling glad about not failing ($\beta = 0.30$, $sr^2 = .06$, $p < .001$), the CFQ ($\beta = 0.20$, $sr^2 = .01$, $p < .05$), being reprimanded by others ($\beta = 0.17$, $sr^2 = .02$, $p < .01$), and negatively associated with punishment for missing plays ($\beta = -0.12$, $sr^2 = .01$, $p < .05$; Table 4).

Excessive Consciousness Toward Others' Evaluation

The SFNE accounted for a significant 22.2% of the variance in Step 1, adjusted $R^2 = .22$, $F(1, 290) = 82.61$, and $p < .001$. The AAQ-II and CFQ were added into the regression equation in Step 2, which accounted for an additional 5.2% of the variance, adjusted $R^2 = .27$, $F(3, 288) = 36.20$, and $p < .001$. In Step 3, excessive consciousness toward others' evaluation was positively associated with feeling glad about not failing ($\beta = 0.30$, $sr^2 = .06$, $p < .001$), being reprimanded by others ($\beta = 0.18$, $sr^2 = .02$, $p < .01$), and the SFNE ($\beta = 0.17$, $sr^2 = .02$, $p < .01$; Table 4).

Excessive Consciousness Toward Seniority

The SFNE accounted for a significant 12.8% of the variance in Step 1, adjusted $R^2 = .13$, $F(1, 290) = 42.61$, and $p < .001$. The AAQ-II and CFQ were added into the regression equation in Step 2, which accounted for an additional 7.1% of the variance, adjusted $R^2 = .19$, $F(3, 288) = 23.86$, and $p < .001$. In Step 3, excessive consciousness toward seniority was positively associated with the AAQ-II ($\beta = 0.25$, $sr^2 = .03$, $p < .001$), being reprimanded by others ($\beta = 0.18$, $sr^2 = .02$, $p < .01$), the SFNE ($\beta = 0.17$, $sr^2 = .02$, $p < .05$), and negatively associated with enjoying baseball ($\beta = -0.13$, $sr^2 = .01$, $p < .05$; Table 4).

Sense of Inferiority

The SFNE accounted for a significant 18.2% of the variance in Step 1, adjusted $R^2 = .18$, $F(1, 290) = 64.34$, and $p < .001$. The AAQ-II and CFQ were added into

Table 2 Means, SD, and Internal Consistency (N = 292)

Variable	M	SD	α	Min	Max	Skewness	Kurtosis
Outcome measures							
Psychological measures of the yips							
Throwing disability scale							
Sense of high strain caused by wild pitch image	5.64	2.82	.94	3	12	0.85	-0.32
Excessive consciousness toward others' evaluation	6.96	3.06	.90	3	12	0.22	-1.23
Excessive consciousness toward seniority	5.02	2.45	.86	3	12	1.15	0.50
Sense of inferiority	7.45	3.39	.90	3	12	0.00	-1.51
Excessive consciousness toward critical situations	6.34	2.81	.92	3	12	0.46	-0.77
Overall score	31.42	12.14	.95	15	60	0.40	-0.84
Behavioral measures of the yips							
Frequency of throwing errors (≤ 27 m)	2.26	2.23	—	0	10	1.50	2.20
Frequency of throwing errors (≥ 27 m)	2.23	1.95	—	0	10	1.40	2.34
Predictor variables							
Acceptance and Action Questionnaire-II	20.01	9.29	.89	7	47	0.75	0.01
Cognitive Fusion Questionnaire	33.23	13.09	.92	9	63	0.10	-0.73
Values							
Enjoying baseball	6.00	1.37	—	1	7	-1.71	2.83
Feeling glad about not failing	5.15	2.06	—	1	7	-0.857	-0.61
Enjoying the play itself	6.20	1.37	—	1	7	-2.14	4.44
Social factors							
Being reprimanded by others	3.09	1.82	—	1	7	0.58	-0.69
Punishment (hard practice) for missing plays	2.51	1.93	—	1	7	1.08	-0.24
Competition to become a regular	3.54	1.89	—	1	7	0.19	-1.12
Control variable							
Short Fear of Negative Evaluation Scale	25.34	7.99	.92	8	40	-0.30	-6.02

Table 3 Pearson's Product-Moment Correlations Among the Study Variables (N = 292)

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. AAQ-II																
2. CFQ	.75***															
3. SFNE	.52***	.64***														
4. Throwing errors (≤27 m)	.16**	.23***	.17**													
5. Throwing errors (≥27 m)	.17**	.17**	.22***	.59***												
6. Wild pitch image	.35***	.38***	.31***	.67***	.40***											
7. Others' evaluation	.43***	.45***	.47***	.43***	.33***	.60***										
8. Seniority	.41***	.35***	.36***	.46***	.30***	.60***	.68***									
9. Sense of inferiority	.37***	.44***	.43***	.54***	.44***	.65***	.61***	.49***								
10. Critical situations	.40***	.45***	.43***	.57***	.46***	.70***	.66***	.54***	.67***							
11. Overall throwing disability scale	.47***	.50***	.48***	.64***	.46***	.85***	.85***	.78***	.84***	.86***						
12. Enjoying baseball	-.10	-.03	.08	-.08	-.04	-.11	-.05	-.18**	-.05	-.05	-.10					
13. Feeling glad about not failing	.29***	.34***	.44***	.27***	.25***	.39***	.49***	.29***	.48***	.46***	.51***	.02				
14. Enjoying the play itself	.14*	.19***	.24***	.03	.01	.06	.17**	.05	.17**	.13*	.14*	.42***	.36***			
15. Being reprimanded by others	.26***	.26***	.22***	.17**	.25***	.26**	.37***	.35***	.29***	.32***	.38***	-.14*	.23***	.08		
16. Punishment for missing plays	.19**	.18**	.11	.01	.09	.05	.21***	.24***	.11	.18**	.18**	-.12*	.09	-.04	.50***	
17. Competition to become a regular	.14*	.11	.08	-.03	.05	.09	.18**	.15**	.12*	.13*	.16**	-.10	.17**	-.04	.11	.06

Note. AAQ-II = Acceptance and Action Questionnaire-II; CFQ = Cognitive Fusion Questionnaire; SFNE = Short Fear of Negative Evaluation Scale; consciousness toward others' evaluation = excessive consciousness toward others' evaluation; consciousness toward critical situations = excessive consciousness toward critical situations; punishment for missing plays = punishment (hard practice) for missing plays; wild pitch image = sense of high strain caused by wild pitch images; others' evaluation = excessive consciousness toward others' evaluation; seniority = excessive consciousness toward seniority; critical situations = excessive consciousness toward critical situations.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4 Hierarchical Multiple Regression Equation Predicting Yips Symptoms (N = 292)

Predictor	Sense of high strain caused by wild pitch image										Excessive consciousness toward others' evaluation										Excessive consciousness toward seniority									
	95% CI for B					B	β	SE	ΔR ²	Adj. R ²	95% CI for B	B	β	SE	ΔR ²	Adj. R ²	95% CI for B					B	β	SE	ΔR ²	Adj. R ²	VIF			
	LL	UL	LL	UL	LL												UL	LL	UL	LL	UL									
Step 1 (constant)	2.87	1.84	3.91	0.52				.1	.09	2.39	1.35	3.43	0.53				.22	.22	2.23	1.35	3.12	0.45					.13	.13		
SFNE	0.11	0.07	0.15	0.02	.31	***		.07	.15	0.18	0.14	0.22	0.02	.47	***		.05	.27	0.11	0.08	0.14	0.02	.36	***			.07	.19	1.00	
Step 2 (constant)	2.38	1.36	3.4	0.52						1.92	0.89	2.95	0.52						1.85	0.99	2.72	0.44								
SFNE	0.04	-0.01	0.08	0.02	.1					0.11	0.06	0.16	0.03	.3	***				0.06	0.02	0.1	0.02	.2	**					1.72	
AAQ-II	0.04	-0.01	0.09	0.02	.14					0.06	0.01	0.11	0.03	.19	*				0.08	0.04	0.13	0.02	.32	***					2.29	
CFQ	0.05	0.01	0.08	0.02	.21	*		.11	.24	0.03	-0.01	0.07	0.02	.11			.13	.39	0	-0.04	0.03	0.02	-0.02						2.86	
Step 3 (constant)	3.03	1.21	4.86	0.92						0.42	-1.36	2.2	0.9						2.26	0.7	3.83	0.79					.09	.26		
SFNE	0	-0.05	0.05	0.03	0					0.07	0.02	0.12	0.02	.17	**				0.05	0.01	0.09	0.02	.17	*					1.93	
AAQ-II	0.03	-0.01	0.08	0.02	.11					0.04	0	0.09	0.02	.14					0.07	0.03	0.11	0.02	.25	***					2.35	
CFQ	0.04	0.01	0.08	0.02	.2	*				0.02	-0.02	0.05	0.02	.08					-0.01	-0.04	0.02	0.02	-0.05						2.88	
Enjoying baseball	-0.1	-0.34	0.14	0.12	-0.05					-0.01	-0.24	0.22	0.12	.00					-0.23	-0.43	-0.03	0.1	-1.3						1.31	
Feeling glad about not failing	0.42	0.25	0.58	0.08	.3	***				0.45	0.29	0.61	0.08	.3	***				0.13	-0.01	0.27	0.07	.11						1.45	
Enjoying the play itself	-0.2	0.45	0.04	0.13	-1					-0.06	-0.3	0.19	0.12	-0.02					-0.02	-0.23	0.2	0.11	-0.01						1.46	
Being reprimanded by others	0.27	0.08	0.46	0.1	.17	**				0.31	0.13	0.5	0.09	.18	**				0.24	0.08	0.4	0.08	.18	**					1.46	
Punishment for missing plays	-0.18	-0.35	-0.01	0.09	-1.2	*				0.04	-0.13	0.21	0.08	.03					0.08	-0.07	0.23	0.07	.06						1.36	
Competition to become a regular	-0.02	-0.18	0.13	0.08	-0.02					0.11	-0.04	0.26	0.08	.07					0.07	-0.06	0.2	0.07	.05						1.06	

(continued)

Table 4 (continued)

Predictor	Sense of inferiority						Consciousness toward critical situations						Overall score of the throwing disability scale						
	95% CI for B			Adj. R ²	ΔR ²	β	95% CI for B			Adj. R ²	ΔR ²	β	95% CI for B			Adj. R ²	ΔR ²	β	
	B	LL	UL				LL	UL	LL				UL	LL	UL				
Step 1 (constant)	2.87	1.69	4.05	0.6	.18	.18	2.5	1.53	3.48	0.49	.19	.18	12.87	8.78	16.96	2.08	.23	.23	
SFNE	0.18	0.14	0.23	0.02	.43	***	0.15	0.11	0.19	0.02	.43	***	0.73	0.58	0.89	0.08	.48	***	1.00
Step 2 (constant)	2.37	1.19	3.54	0.6	.05	.22	2.03	1.07	2.99	0.49	.06	.24	10.55	6.58	14.52	2.02	.08	.3	
SFNE	0.1	0.05	0.16	0.03	.24	***	0.08	0.03	0.13	0.02	.23	***	0.4	0.2	0.59	0.1	.26	***	1.72
AAQ-II	0.02	-0.03	0.08	0.03	.07		0.04	-0.01	0.08	0.02	.12		0.25	0.06	0.44	0.1	.19	***	2.29
CFQ	0.06	0.02	0.1	0.02	.23	**	0.05	0.01	0.08	0.02	.21	*	0.17	0.02	0.33	0.08	.19	*	2.86
Step 3 (constant)	1.51	-0.56	3.58	1.05	.11	.32	1.3	-0.41	3	0.87	.11	.33	8.53	1.75	15.31	3.44	.14	.43	
SFNE	0.05	-0.01	0.1	0.03	.11		0.04	-0.01	0.09	0.02	.12		0.21	0.02	0.39	0.09	.14	*	1.93
AAQ-II	0.01	-0.04	0.06	0.03	.03		0.02	-0.02	0.07	0.02	.08		0.18	0	0.35	0.09	.14	*	2.35
CFQ	0.05	0.01	0.09	0.02	.21	*	0.04	0	0.07	0.02	.18	*	0.14	0.01	0.28	0.07	.16	*	2.88
Enjoying baseball	-0.07	-0.34	0.2	0.14	-.03		0	-0.22	0.22	0.11	0		-0.41	-1.3	0.47	0.45	-.05		1.31
Feeling glad about not failing	0.54	0.36	0.73	0.1	.33	***	0.42	0.26	0.57	0.08	.31	***	1.96	1.34	2.57	0.31	.33	***	1.45
Enjoying the play itself	-0.05	-0.33	0.24	0.14	-.02		-0.13	-0.36	0.1	0.12	-.06		-0.45	-1.38	0.48	0.47	-.05		1.46
Being reprimanded by others	0.27	0.05	0.48	0.11	.14	*	0.23	0.06	0.41	0.09	.15	**	1.32	0.62	2.02	0.36	.2	***	1.46
Punishment for missing plays	-0.08	-0.28	0.11	0.1	-.05		0.02	-0.14	0.18	0.08	.01		-0.12	-0.76	0.52	0.32	-.02		1.36
Competition to become a regular	0.01	-0.16	0.19	0.09	.01		0.03	-0.12	0.17	0.07	.02		0.2	-0.38	0.77	0.29	.03		1.06

(continued)

Table 4 (continued)

Predictor	Frequency of throwing errors (≤ 27 m)						Frequency of throwing errors (≥ 27 m)											
	95% CI for B			ΔR^2	Adj. R^2	B	95% CI for B			ΔR^2	Adj. R^2	B						
	LL	UL	SE B				LL	UL	SE B									
Step 1 (constant)	1.03	0.19	1.88	0.43	.03	.03	0.85	0.11	1.58	0.37								
SFNE	0.05	0.02	0.08	0.02	.17	**	0.05	0.03	0.08	0.01	.22	***						
Step 2 (constant)	0.82	-0.03	1.67	0.43	.03	.05	0.78	0.03	1.53	0.38								
SFNE	0.01	-0.03	0.05	0.02	.04		0.05	0.01	0.08	0.02	.19	*						
AAQ-II	-0.01	-0.05	0.03	0.02	-0.03		0.02	-0.02	0.05	0.02	.09							
CFQ	0.04	0.01	0.07	0.02	.23	*	0	-0.03	0.03	0.01	-0.02							
Step 3 (constant)	1.66	0.1	3.22	0.79	.08	.11	0.76	-0.61	2.14	0.7								
SFNE	-0.01	-0.05	0.03	0.02	-0.04		0.03	-0.01	0.07	0.02	.12							
AAQ-II	-0.01	-0.05	0.03	0.02	-0.05		0.01	-0.02	0.05	0.02	.06							
CFQ	0.04	0.01	0.07	0.02	.22	*	-0.01	-0.03	0.02	0.01	-0.04							
Enjoying baseball	-0.07	-0.27	0.13	0.1	-0.04		0.04	-0.14	0.22	0.09	.03							
Feeling glad about not failing	0.28	0.14	0.42	0.07	.26	***	0.18	0.05	0.3	0.06	.19	**						
Enjoying the play itself	-0.15	-0.36	0.07	0.11	-0.09		-0.17	-0.35	0.02	0.1	-0.12							
Being reprimanded by others	0.17	0.01	0.33	0.08	.14	*	0.23	0.09	0.38	0.07	.22	***						
Punishment (hard practice) for missing plays	-0.13	-0.27	0.02	0.07	-0.11		-0.05	-0.18	0.08	0.07	-0.05							
Competition to become a regular	-0.12	-0.25	0.01	0.07	-0.1		-0.02	-0.13	0.1	0.06	-0.02							

Note. Bold indicates significant values. CI = confidence interval; LL = lower limit; UL = upper limit; SFNE = Short Fear of Negative Evaluation Scale; AAQ-II = Acceptance and Action Questionnaire-II; CFQ = Cognitive Fusion Questionnaire.

* $p < .05$. ** $p < .01$. *** $p < .001$.

the regression equation, accounting for an additional 4.8% of the variance in Step 2, adjusted $R^2 = .22$, $F(3, 288) = 28.57$, and $p < .001$. In Step 3, the sense of inferiority was positively associated with feeling glad about not failing ($\beta = 0.33$, $sr^2 = .08$, $p < .001$), the CFQ ($\beta = 0.21$, $sr^2 = .01$, $p < .05$), and being reprimanded by others ($\beta = 0.14$, $sr^2 = .01$, $p < .05$; Table 4).

Excessive Consciousness Toward Critical Situations

The SFNE accounted for a significant 18.6% of the variance in Step 1, adjusted $R^2 = .18$, $F(1, 290) = 66.28$, and $p < .001$. The AAQ-II and CFQ were added into the regression equation in Step 2, which accounted for an additional 5.9% of the variance, adjusted $R^2 = .24$, $F(3, 288) = 31.15$, and $p < .001$. In Step 3, excessive consciousness toward critical situations was positively associated with feeling glad about not failing ($\beta = 0.31$, $sr^2 = .06$, $p < .001$), the CFQ ($\beta = 0.18$, $sr^2 = .01$, $p < .05$), and being reprimanded by others ($\beta = 0.15$, $sr^2 = .02$, $p < .01$; Table 4).

Overall Scores of the Throwing Disability Scale

The SFNE accounted for a significant 23.2% of the variance in Step 1, adjusted $R^2 = .23$, $F(1, 290) = 87.62$, and $p < .001$. The AAQ-II and CFQ were added into the regression equation in Step 2, which accounted for an additional 7.8% of the variance, adjusted $R^2 = .30$, $F(3, 288) = 43.15$, and $p < .001$. In Step 3, overall score of the Throwing Disability Scale was positively associated with feeling glad about not failing ($\beta = 0.33$, $sr^2 = .08$, $p < .001$), being reprimanded by others ($\beta = 0.20$, $sr^2 = .03$, $p < .001$), the CFQ ($\beta = 0.16$, $sr^2 = .01$, $p < .05$), the SFNE ($\beta = 0.14$, $sr^2 = .01$, $p < .05$), and the AAQ-II ($\beta = 0.14$, $sr^2 = .01$, $p < .05$; Table 4).

Frequency of Throwing Errors (≤ 27 m)

The SFNE accounted for a significant 3.0% of the variance in Step 1, adjusted $R^2 = .03$, $F(1, 290) = 9.08$, and $p < .01$. The AAQ-II and CFQ were added into the regression equation in Step 2, which accounted for an additional 2.5% of the variance, adjusted $R^2 = .05$, $F(3, 288) = 0.65$, and $p < .001$. In Step 3, the frequency of throwing errors (≤ 27 m) was positively associated with feeling glad about not failing ($\beta = 0.26$, $sr^2 = .05$, $p < .001$), CFQ ($\beta = 0.22$, $sr^2 = .02$, $p < .05$), and being reprimanded by others ($\beta = 0.14$, $sr^2 = .01$, $p < .05$; Table 4).

Frequency of Throwing Errors (≥ 27 m)

The SFNE accounted for a significant 5.0% of the variance in Step 1, adjusted $R^2 = .05$, $F(1, 290) = 15.20$, and $p < .001$. The AAQ-II and CFQ were added into the regression equation but did not significantly account for any of the variances in Step 2, adjusted $R^2 = .04$, $F(3, 288) = 5.47$, and $p < .001$. In Step 3, the frequency of throwing errors (≥ 27 m) was positively associated with being reprimanded by others ($\beta = 0.22$, $sr^2 = .03$, $p < .001$), and feeling glad about not failing ($\beta = 0.19$, $sr^2 = .02$, $p < .01$; Table 4).

Discussion

This study investigated the relationships between throwing yips in baseball, experiential avoidance, cognitive fusion, values-based throwing, and social factors. The results indicated that feeling glad about not failing, the CFQ score, and being reprimanded by others increased the sense of high strain caused by wild pitch image, sense of inferiority, excessive consciousness toward critical situations, and frequency of throwing errors (≤ 27 m). In addition, feeling glad about not failing, the SFNE score, and being reprimanded by others were positively associated with excessive consciousness toward others' evaluation. Furthermore, the AAQ-II score, being reprimanded by others, and the SFNE score were positively associated with the excessive consciousness toward seniority score, whereas enjoying baseball was negatively associated with that score. The AAQ-II did not predict multiple yips symptoms. However, this study's results generally supported the study's hypotheses. Hence, changing the context (e.g., fear of missing plays) of playing baseball and reducing cognitive fusion could improve many yips symptoms. In addition, the findings suggest the significance of improving athletes' social environments, particularly reducing teammates', and supervisors' reprimands for mistakes.

Clinical Implications

This study indicated that athletes experiencing throwing yips tend to think, "When a throw goes well, I feel glad that I did not fail," suggesting that they are focused on the fear of making a mistake, which might result in persistent yips. Bawden and Maynard (2001) reported that athletes "avoid throwing the ball out of fear of failure or fear of being seen as incompetent by others" (p. 942). Therefore, it might be necessary to manipulate the context in which athletes participate in sports. The results of this study suggest the need to encourage athletes to rethink the purpose of sports, the desire to play well, and the joy of playing, instead of playing with a focus on not making mistakes. We also suggest that it is essential for athletes to distance themselves from negative thoughts around making mistakes. In addition, this study's results indicated that being reprimanded for mistakes was positively associated with all the indicators of yips. When athletes think about being reprimanded, it is likely to be related to a context that does not accept errors, which might increase thoughts such as "I must not make mistakes." These thoughts might intimidate athletes and prolong their yips. Moreover, this study's results suggest that improving coaching methods might reduce the risk of throwing yips in baseball.

Moreover, this study also suggested that higher cognitive fusion positively associated with the sense of high strain caused by wild pitch images, the sense of inferiority at not being able to pitch, excessive consciousness toward critical situations, and the frequency of throwing errors (≤ 27 m). Previous studies have associated self-consciousness with the yips (Wang et al., 2004). Our research also supports these studies, in particular the elements of overthinking leading to persistent yips symptoms. For instance, a yips sufferer in Bawden and Maynard's (2001) study noted that "the negative train of thought is never far away, even in practice" and "I couldn't concentrate on what I was doing, my mind was just full of panic and confusion." Hence, athletes distancing themselves from negative thoughts could be an effective intervention for supporting people with the yips.

Furthermore, cognitive fusion, which is associated with the frequency of throwing errors over short distances, was not associated with the frequency of throwing errors over long distances in this study. Aoyama et al. (2021) reported that 50% of players showed moderate or high throwing yips symptoms when throwing from 20 m or less, 32.6% of players showed yips symptoms when throwing from 20 m to 27 m, and 8.1% showed yips symptoms in throws over 50 m, suggesting that yips frequency decreases as the distance thrown increases. Moreover, Aoyama et al. (2021) reported the incidences of the yips among college baseball players by playing position, 41.9% in pitchers, 54.2% in catchers, 53.1% in infielders, and 35.3% in outfielders, which indicated no significant differences based on the positions. However, they reported a tendency for infielders and catchers to have a high incidence of yips. Furthermore, yips symptoms appear more frequently when throwing with light to moderate force than when throwing with full force (Aoyama et al., 2021). Golfers have also reported more frequent yips in short shots, such as putting, than in longer shots (Smith et al., 2003). Thus, yips might be associated with simple movements that do not require dynamic body movements. We suggest that players might be more susceptible to the effects of their thoughts when throwing over short distances because simple movements do not demand whole-body attention. By contrast, long-distance throwing requires large body movements and demands the attention of the whole body. Therefore, interventions opposite to cognitive fusion, such as mindfulness and attention being given to the whole body, might be essential for improving yips symptoms. One study on basketball players has reported that combining mindfulness, skills (free throwing practice percentage), and competitive experiences contributed to a higher percentage of free throws (Gooding & Gardner, 2009). Moreover, a case study of college track-and-field athletes reported that sport-specific mindfulness interventions can reduce trait anxiety, self-consciousness, and choking susceptibility (Hussey et al., 2020). Further research is needed to determine whether interventions for weakening cognitive fusion and developing mindfulness are appropriate for the yips.

This study examined the predictive power of the AAQ-II, CFQ, and SFNE for yips symptoms in Step 2 of the hierarchical multiple regression analysis. We hypothesized that the AAQ-II and CFQ predict most yips symptoms. However, the SFNE scores also predicted yips symptoms, including excessive consciousness toward others' evaluations, excessive consciousness toward seniority, the sense of inferiority, and excessive consciousness toward critical situations. This might be because the Throwing Disability Scale items were more closely related to being conscious of others' evaluations. Although depending on the nature of the yips symptoms, Clarke et al. (2020) established relationships between yips symptoms and others' negative evaluations. We suggest athletes distance themselves from others' negative evaluations, to improve yips symptoms resulting from interpersonal factors.

In this study, contrary to our hypothesis that penalty practice methods increase the yips, punishment for missing plays was negatively associated with the sense of high strain caused by wild pitch images. Thus, athletes who practiced regularly while experiencing penalties were less nervous during actual throwing, which might indicate that exposure to tension during regular practice reduces strain during games. However, athletes and coaches should be careful when using penalties because the opposite effect may occur if participants become excessively conscious of avoiding failure.

Context About the Country in This Investigation

Since this study was conducted with a Japanese sample, the cultural characteristics of Japan must be considered when interpreting this study's results. First, Japanese culture and sports circles have a strong sense of hierarchy (e.g., [Ono & Shoji, 2015](#)), which might have influenced the results of excessive consciousness toward seniority, one of the dependent variables in this study. Therefore, these results might differ in the context of other countries. Second, club activities in Japan often emphasize controlling own feelings, which might have affected the proportion of yips-affected people and the degree of experiential avoidance. Therefore, we suggest conducting international comparative studies on yips in the future.

Limitations and Future Outlook

This study has several limitations. First, we did not examine the validity or the reliability of the Values-Based Throwing Index. Therefore, the results on values should be interpreted and generalized with caution. The concept of values in ACT is complex and varies depending on the individual. Therefore, judging whether an athlete conducts values-based throwing based only on this simplified index is difficult. Future research should confirm the validity and reliability of this scale. Second, this study's questionnaire was administered online to teams and players who were permitted to participate, which might result in a response bias, with a high response rate from those with an interest on the yips. Finally, the study results were based on data obtained from self-report questionnaire surveys rather than behavioral tasks. We suggest that future studies, similar to [Klämpfl et al. \(2015\)](#), develop and use kinematic screening tests to detect throwing yips). Moreover, as this study was a cross-sectional study, causal relationships could not be determined. Therefore, future studies should investigate whether psychological interventions such as ACT for the yips can improve actual behavioral indices (throwing mistakes, the ball's speed, and the spin rate). Furthermore, studies should investigate whether experiential avoidance, cognitive fusion, values, and social factors are intervening variables in the yips. In addition, it is essential to conduct studies to better understand the yips from a psychological perspective and develop intervention methods to improve behavioral skills, including throwing skills.

Acknowledgments

We sincerely thank the Japanese baseball players who participated in this survey. We are also appreciative of the people who helped us conduct this study, including Kanta Kobayashi, Kohei Watanabe, Kazunori Araki, Riko Matsuno, Chika Umezu, Manabu Yoshimoto, Taishi Yoshimoto, Kazuhiro Akiyama, Shigeru Kida, Nanako Matsumoto, Manami Kamo, Honoka Muramatsu, Rina Tamaki, Misaki Oka, Haruki Sakamoto, Tatsuya Inoue, Natsumi Fujita, Chihiro Aihara, Kana Kobayashi, and Kazuhiro Ishida. Moreover, we are grateful to the following universities baseball teams for their cooperation: Hiroshima Shudo University, Hiroshima University, Tokyo University, Shiga University, Ehime University, Nagasaki University, Toyoma University, Okayama University, Yamaguchi University, Yamaguchi Junior College, Tohoku University, Oita University, Kochi

University, Ibaraki University, and Waseda University (Wasebi), Waseda University Tokorozawa Campus, Waseda University Senior High School, and Shiga All Blacks. This work was supported by JSPS KAKENHI under grant (number JP20K23267). Availability of Data: https://osf.io/fwc4z/?view_only=5f10c01783304eaeac1e2190a564e127.

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