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1 **Measuring Grateful Climate at the Sports Team**

2
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25
- 26 ● Conflict of interest statement: The authors declare that they have no conflict of interest.
 - 27 ● Compliance of ethical standard statement: This study was approved by the National Taiwan
28 University review board (202012ES010)
 - 29 ● Informed consent: The athletes were instructed to read the information sheet, and signed an
30 informed consent form before the survey. Therefore, their confidentiality and anonymity
31 were ensured.
 - 32 ● The data for this study were collected in the context of a larger project (a six-waves of data
33 collection across three years) supervised and funded by the first authors. Current study used
34 the second wave of variables from the project. We declare that the Gratitude Questionnaire-
35 Sport in this study also reported in another independent article under review aim at
36 capturing the growth of athlete's gratitude. Apart from this, neither the analysis nor the
37 findings had been reported in prior work.

38
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52

Abstract

53 Developing a measurement of grateful climate is an essential step to examining the function of a

54 grateful climate in a team or group context. Accordingly, the purpose of this study was to

55 develop a valid and reliable measure of the grateful climate of sports teams. We defined the

56 grateful climate of sports teams as a culturally shaped perception that team members collectively

57 exhibit values, beliefs and expected behaviors that fit with the script of gratitude. Exploratory

58 factor analysis and multilevel confirmatory factor analysis were conducted to evaluate the

59 validity and reliability of the Sports Team Grateful Climate Questionnaire. In addition,

60 nomological validity and incremental validity were also examined. The results indicated that the

61 9-item Sports Team Grateful Climate Questionnaire has good convergent validity, nomological

62 validity, and incremental validity. We concluded that it can be a useful tool for future studies

63 aiming to better understand grateful climate in sports teams.

64 *Keywords:* gratitude, sports team, scale development, multilevel analysis

65 **Measuring Grateful Climate at the Sports Team**

66 Studies to date have consistently demonstrated the positive effects of gratitude on
67 individuals' thoughts and actions (Fredrickson, 2004; McCullough et al., 2001; Wood et al.,
68 2010). As a result, gratitude has been conceptualized and measured, with scholars offering
69 different perspectives on its nature. For instance, McCullough et al. (2002) define gratitude as an
70 affective trait that encompasses individuals' general tendency to recognize and respond with
71 grateful emotion to the benevolent actions of others, resulting in positive experiences and
72 outcomes (p. 112). Additionally, McCullough et al. (2004) define gratitude as an emotion that is
73 consistently experienced when individuals perceive themselves as recipients of intentionally
74 bestowed valuable benefits that come at a cost to the benefactor (p. 296). These definitions
75 predominantly focus on the conventional approach of studying gratitude at the individual level.

76 However, gratitude can also be conceptualized at a collective level beyond individuals. Fehr
77 et al. (2017) propose a conceptual multilevel model of gratitude that extends the concept to teams
78 or groups, encouraging researchers to explore the role of gratitude in such contexts. In group
79 settings, a consensus emerges from members or social norms, shaping individuals' cultural
80 values and behaviors (Chen & Hsu, 2022). This broader conceptualization of gratitude highlights
81 the potential influence of collective dynamics and cultural factors on the experience and
82 expression of gratitude.

83 To the best of our knowledge, no existing measurement tool captures gratitude at the group
84 level beyond the individual level, which is a crucial step in empirically examining the function of
85 a grateful atmosphere within team or group contexts. Without defining and measuring gratitude
86 at the group level, we would be unable to address important questions. For instance, what are the
87 factors that contribute to a higher level of gratitude within a group, and what are the

88 consequences associated with such a higher level? How do teams characterized by a strong sense
89 of gratitude differ in their thoughts and actions compared to teams with lower levels of gratitude?
90 Under what conditions does a higher level of gratitude enhance or diminish members' cognitive
91 processes, emotions, and behaviors at the individual level? Clearly, in order to answer these
92 questions, it is crucial to have a well-defined and reliable measure of gratitude at the group level.

93 To address this research gap, the objective of the present study was to develop a valid and
94 reliable measure of the grateful atmosphere within sports teams. We propose that this construct
95 should be labeled as "gratitude climate," which refers to the group-level atmosphere, as
96 suggested by Luria (2019) . It is important to note that the concept of grateful climate at the team
97 or group level cannot be adequately assessed by simply utilizing existing measures of gratitude at
98 the individual level, as outlined in Chan (1998) r referent-shift model. Gratitude climate
99 represents a distinct construct that cannot be aggregated from individual-level gratitude measures
100 specific to the sports domain.

101 In the context of sports teams, the proverbial saying, "There is no 'I' in the team," highlights
102 the collective nature of teamwork, making it an ideal setting to develop an initial tool for
103 measuring gratitude at a higher level. Within a team, athletes work and often live together,
104 facilitating the sharing of values, thoughts, and behaviors through interpersonal interactions.
105 Moreover, cultural values provide a framework that guides athletes to conform to certain cultural
106 norms (Chen & Hsu, 2022; Fehr et al., 2017). Consequently, gratitude becomes a characteristic
107 that extends beyond individual team members and becomes inherent to the team itself. Thus, in
108 this study, we define the grateful climate of sports teams as the shared perception among team
109 members regarding their values, beliefs, and expected behaviors related to gratitude.

110 In the subsequent sections, we will review existing gratitude theory and present a rationale
111 for the conceptualization of grateful climates within sports teams. The development and
112 validation of items will be outlined, encompassing various phases of the research process.
113 Specifically, we will carefully examine Fehr et al. (2017) multilevel model of gratitude and make
114 slight modifications based on Luria (2019) concept of "climate" and Chan's (1998) referent-shift
115 model. Additionally, we will provide a comprehensive description of the manifestation of
116 gratitude climate in the sports domain, drawing on insights from prior empirical studies (Hsu et
117 al., 2020). Through this study, we aim to make a valuable contribution to the existing gratitude
118 literature by introducing a measurement tool and investigating relevant concepts pertaining to
119 grateful climates within sports teams.

120 *Gratitude at the Individual Level*

121 Gratitude has been conceptualized as an emotion, mood, or affective trait in the literature
122 (McCullough et al., 2002). As an emotion, gratitude can arise from specific events, such as
123 unexpectedly receiving help from a stranger in times of need. It is important to note that
124 gratitude encompasses more than just a positive emotion; it also elicits prosocial motivation,
125 leading individuals to engage in helpful and benevolent behaviors (Bartlett & DeSteno, 2006;
126 Tsang & Martin, 2019). Gratitude can also be experienced as a mood that can vary throughout
127 the day or across different days (Rosenberg, 1998, p. 250). Grateful moods tend to have a
128 sustained duration and a gentle intensity. However, the aspect of gratitude that has received the
129 most attention in the literature is its affective trait form. Affective trait gratitude refers to an
130 individual's inherent tendency to recognize and respond with grateful emotions to the benevolent
131 actions and contributions of others, leading to positive experiences and outcomes (McCullough
132 et al., 2002, p. 112).

133 Gratitude has been conceptualized in various ways, and extensive research has consistently
134 demonstrated its adaptive effects on individuals. Grateful individuals exhibit positive tendencies
135 and behaviors, such as positive reinterpretation of events (Lambert et al., 2011; Wood et al.,
136 2007). They tend to view hardships as challenges rather than threats, enabling them to effectively
137 cope with stress (Hsu et al., 2020). Gratitude also promotes the alignment between coping
138 strategies and specific circumstances, providing protection against stress (Sun et al., 2020).
139 Furthermore, daily experiences of gratitude, as reported by Nezlek et al. (2019), were found to be
140 positively associated with well-being indicators at the individual level. Additionally, daily
141 gratitude experiences served as a buffer, mitigating the impact of stressful events on well-being
142 indicators. Since the influential publication by McCullough et al.'s (2002), research on gratitude
143 has expanded and diversified, exploring various dimensions and types of gratitude.

144 These definitions primarily focus on studying gratitude at the individual level, but it is
145 worth noting that gratitude can also be conceptualized at a level beyond individuals. In a recent
146 work, Fehr et al. (2017) put forth a conceptual multilevel model of gratitude, expanding the
147 scope of gratitude to include the team or group level. They encouraged researchers to investigate
148 the role of gratitude in these collective contexts, highlighting the importance of studying
149 gratitude beyond the individual level.

150 *Gratitude at Group Level*

151 The multilevel model of gratitude proposed by Fehr et al. (2017) offers a new perspective to
152 broaden the scope of gratitude beyond previous studies that primarily focused on intrapersonal
153 gratitude at the trait level. Their model introduces a bottom-up process that encompasses
154 different levels of gratitude. According to Fehr et al. (2017), this multilevel model includes (1)
155 episodic gratitude as an emotion at the event level, (2) persistent gratitude as an individual-level

156 tendency, and (3) collective gratitude at the organizational level (p. 362). The concept of
157 collective gratitude, as defined by Fehr et al. (2017), refers to the enduring experience of
158 gratitude that is shared among members of an organization (p. 346). They propose that collective
159 gratitude at the organizational level emerges from individual-level persistent gratitude through
160 social interaction and exchange. Fehr et al. (2017) also highlight that their multilevel model of
161 gratitude, which focuses on consensus among individual members' perspectives and experiences,
162 aligns with Chan's (1998) "direct consensus model."

163 In this model, aggregating individual-level data to a higher level of analysis involves
164 examining within-group agreement of scores to indicate consensus at the lower level and justify
165 the aggregation of lower-level scores to represent scores at the higher level. Therefore, Fehr et
166 al.'s (2017) multilevel model of gratitude is considered a bottom-up process model as it adopts
167 the direct consensus model (Chan, 1998), whereby collective gratitude at the organizational level
168 emerges from individual-level persistent gratitude.

169 *Conceptualization of a Grateful Climate*

170 We acknowledge and adopt the multilevel model of gratitude presented by Fehr et al.
171 (2017), which expands the concept of gratitude from the individual level to the organizational
172 (team) level. However, we deviate from Fehr et al. (2017) in terms of the conceptualization of
173 collective gratitude at the group level. While Fehr et al. (2017) propose that collective gratitude
174 is not a distinct construct independent of individual gratitude but rather the aggregation of
175 persistent gratitude scores at the individual level, in our research, we refer to the group-level
176 gratitude as "gratitude climate" based on Luria's (2019) framework. We assert that gratitude
177 climate is a unique construct that should not be aggregated with intrapersonal gratitude at the
178 individual level.

179 "Climate perception" at the group level, as proposed by Luria (2019), is formed through a
180 dynamic process consisting of three stages (Luria, 2019, p. 1059): (a) exposure to events, where
181 members of the same group share similar experiences that contribute to the emergence of the
182 climate; (b) interpretation of events, where group members engage in a collective sense-making
183 process that leads to shared opinions based on their experiences; and (c) preservation of
184 behaviors and perceptions, where groups develop mechanisms to maintain uniformity and
185 similarity once the group climate is established. These three stages form a cyclical process that
186 enhances and sustains a shared climate at the group level.

187 It can be inferred that during the exposure and interpretation stages, the "environment" in
188 which group members are repeatedly exposed to events plays a significant role in reinforcing the
189 existing climate. Therefore, the social or cultural norms within the environment in which
190 participants live, including the dominant culture of communication and self-construal, deserve
191 special attention. Additionally, cultural values serve as a guiding framework that directs athletes
192 to adhere to a set of cultural norms (Chen & Hsu, 2022; Fehr et al., 2017). Based on the
193 aforementioned review, we define the grateful climate of sports teams as a culturally shaped
194 perception in which team members collectively exhibit values, beliefs, and expected behaviors
195 that align with gratitude.

196 *Referent-shift Consensus Model of Grateful Climate*

197 In our study, we propose that gratitude climate is a unique construct that cannot be
198 aggregated with intrapersonal gratitude at the individual level, as suggested by Fehr et al. (2017).
199 Instead, we adopt the concept of "climate" proposed by Luria (2019), which emphasizes the
200 aggregation of individuals as a group and recognizes the interdependence among group members
201 in the emergence and shared perception of climate. The process of perceiving the environment

202 within a group is social and interconnected, constituting a group-level climate. This approach
203 aligns with the "referent-shift consensus model," which differs from the "direct consensus
204 model" employed in Fehr et al.'s (2017) multilevel model of gratitude.

205 The referent-shift model, similar to the direct consensus model, involves composing lower-
206 level individual attributes into a higher-level group construct. However, in the referent-shift
207 model, there is a conceptual shift in the referent, whereby the individual-level construct is
208 defined and operationalized in terms of "we," "our group," or "members of our team" instead of
209 the individual "I" used in the direct consensus model (Chan, 1998, p. 238). This shift in referent
210 reflects a change in the conceptual definition and measurement of the individual level,
211 considering the higher-level structure. For example, while the direct consensus model aggregates
212 survey items that capture individual perceptions (e.g., "I think..."), the referent-shift consensus
213 model aggregates items that reflect an individual's perception of some higher-level entity (e.g.,
214 "People on our team think...").

215 To provide further support for adopting the referent-shift consensus model in our study, we
216 integrate it with the dynamic model of group-level climate emergence labeled the "exposure,
217 interpretation, preservation model of group-level climate emergence" proposed by Luria (2019).
218 This combination enhances the persuasiveness and explanatory power of our approach.

219 *Items of a Grateful Climate*

220 According to the explanation mentioned above, the grateful climate is conceptualized as an
221 independent construct and not merely an aggregation of individual gratitude among group
222 members. Therefore, one of the main objectives of this study is to develop a scale to measure the
223 grateful climate. The development of the Grateful Climate Scale is based on three key
224 perspectives. First, in line with the Referent-shift Consensus Model (Chan, 1998), the current

225 study adopts a group and consensus level approach by using terms such as "we," "everyone," and
226 "people on our team" instead of individual-level pronouns ("I") when formulating the scale
227 items. Specifically, participants are asked to indicate their level of agreement with the perceived
228 expression of gratitude by team members (e.g., people or everyone on this team) rather than
229 reporting their personal experience of gratitude.

230 Second, as we define grateful climate in sports teams as a culturally shaped perception
231 characterized by collective values, beliefs, and expected behaviors aligned with gratitude, we
232 take into account the surrounding cultural context in which athletes reside. To explore the
233 cultural values, beliefs, and behaviors associated with gratitude, we examine the meanings and
234 implications of gratitude found in slang or idioms that reflect cultural values. For instance,
235 expressions such as "never forget where one's happiness comes from," "pay the debt of
236 gratitude," "know for sure would return one's favor," and "remember owing a debt of gratitude
237 and be grateful until death" demonstrate the enduring nature of cultural values, beliefs, and
238 behaviors related to expressing gratitude towards benefactors. These rich denotations and
239 connotations of gratitude found in slang or idiomatic expressions should be considered when
240 formulating items for the Grateful Climate at Sports Team scale. Additionally, empirical studies
241 conducted in the sports domain have also highlighted the values, beliefs, and behaviors
242 associated with expressing gratitude towards benefactors or givers, emphasizing the notion of
243 ongoing reciprocity (Hsu et al., 2020).

244 Finally, the development of the Sports Team Grateful Climate Questionnaire takes into
245 consideration the specific characteristics of athletes and their expressions of gratitude in the
246 sports context. Building upon the work of Hsu et al. (2020), several key characteristics of
247 gratitude in athletes inform the design of the questionnaire. Firstly, athletes' gratitude is

248 characterized by its enduring nature, as they strive to repay their benefactors regardless of the
249 passage of time. Secondly, athletes express gratitude towards various targets and content,
250 including gratitude for the provision of training resources, the foundational contributions of
251 predecessors, and others who have supported them, without necessarily singling out specific
252 individuals. Additionally, the boundless nature of gratitude is reflected in athletes' inclination to
253 extend their gratitude not only to their benefactors but also to the general public. Moreover,
254 athletes seize opportunities to express gratitude, even if it means repaying their benefactors or
255 passing on the kindness to others many years later. The Sports Team Grateful Climate
256 Questionnaire aims to measure the grateful climate within sports teams by drawing upon relevant
257 gratitude theories, such as the referent-shift consensus model (Chan, 1998), cultural beliefs, and
258 insights from previous empirical studies conducted in the sports field.

259 *Study Overview*

260 To establish the construct validity of the Sports Team Grateful Climate Questionnaire, a
261 series of five steps were undertaken. Firstly, the authors developed the initial set of items to
262 provide an operational definition of the grateful climate construct. To ensure content validity, a
263 panel of experts assessed the alignment between the conceptual and operational definitions of the
264 construct. Secondly, an exploratory factor analysis was performed to evaluate the quality of the
265 items and to identify the underlying factor structure of the grateful climate within sports teams.
266 Thirdly, a multilevel confirmatory factor analysis was conducted to confirm the factor validity of
267 the Sports Team Grateful Climate Questionnaire.

268 Fourth, to establish the nomological validity of the Sports Team Grateful Climate
269 Questionnaire, three constructs at the team level were examined. Firstly, coaches' autonomy
270 support was assessed, which refers to the support provided by coaches to empower team

271 members in setting their goals and activities, and is recognized as a significant motivational
272 factor in sport teams (Fenton et al., 2014). This construct was chosen to demonstrate that a
273 grateful climate is distinct from coaches' behaviors. However, it was expected that teams
274 receiving greater autonomy support from coaches would develop a stronger grateful climate, as
275 coach autonomy support is an influential contextual factor that impacts all team members and
276 fosters a sense of gratitude among them. Besides, the subjective vitality of teams, which
277 represents the overall level of subjective vitality experienced by team members, was examined.
278 This concept was selected to demonstrate that a grateful climate is conceptually distinct from
279 vitality but can contribute to the overall vitality of teams. Teams with a more grateful climate are
280 likely to experience positive emotions, which can enhance team energy through the broaden and
281 build process proposed by Fredrickson (2003). Lastly, sports-specific gratitude at the team level
282 was included to demonstrate that the composition of team members in terms of their trait
283 gratitude can facilitate the development of a more grateful climate. When team members possess
284 higher levels of sports-specific gratitude, the team is more likely to exhibit behaviors and
285 communication that express gratitude during their interactions, thereby contributing to the
286 cultivation of a grateful climate. It should be noted that sports-specific gratitude is distinct from
287 the grateful climate construct, as the former pertains to the individual trait of gratitude among
288 team members, while the latter encompasses gratitude-related beliefs, values, and behaviors
289 expressed through the interactions among team members.

290 Fifth, to further establish the unique contribution of a grateful climate, we conducted
291 additional analyses to examine whether the expected positive associations between grateful
292 climate and coaches' autonomy support, as well as subjective vitality, remain significant even
293 after controlling for sports-specific gratitude. By controlling for sports-specific gratitude, we

294 aimed to assess whether the positive associations between grateful climate and these two
295 constructs hold true independently of the individual trait of gratitude among team members.

296 If the positive association between grateful climate and coaches' autonomy support remains
297 significant after accounting for sports-specific gratitude, it indicates that a grateful climate can be
298 fostered through situational factors, such as the support provided by coaches, and is not solely
299 reliant on the individual trait of sports-specific gratitude among team members. Similarly, if the
300 positive association between grateful climate and subjective vitality remains significant after
301 controlling for sports-specific gratitude, it suggests that the development of vitality within teams
302 can be influenced by grateful interactions among team members, beyond the effects of their
303 individual levels of sports-specific gratitude.

304 Through these five steps, we aimed to provide preliminary evidence supporting the
305 construct validity of the Sports Team Grateful Climate Questionnaire by examining its
306 associations with coaches' autonomy support, subjective vitality, and sports-specific gratitude at
307 the team level.

308 **Method**

309 **Phase One**

310 **Item Development and Content Validity**

311 The authors developed an item stem for the Sports Team Grateful Climate Questionnaire
312 based on their definition of a grateful climate within sports teams. This definition suggests that
313 team members collectively demonstrate values, beliefs, and expected behaviors aligned with
314 gratitude. The response options provided a means for respondents to indicate their agreement
315 with the statement or answer the question, thereby assessing the degree to which they perceive a
316 grateful climate. Additionally, to explore cultural values, beliefs, and behaviors related to

317 gratitude, the authors examined slang or idiomatic expressions associated with gratitude,
318 considering their connotations and implications. Furthermore, in line with the Referent-shift
319 Consensus Model (Chan, 1998), this study employed the consensus level term as the subject term
320 in item stems. By utilizing terms such as "we," "everyone," or "people on our team," the
321 researchers aimed to gauge participants' perception of gratitude expressed by fellow team
322 members rather than focusing solely on individual experiences.

323 Then, participants were instructed to indicate their level of agreement with the gratitude
324 expressed by team members (e.g., individuals within the team or everyone), rather than their
325 personal gratitude. The item stems were formulated using subject terms such as "People on our
326 team think that...," "On this team, people...," "Everyone on our team...," and so on. Additionally,
327 to ensure the suitability of the items for the sports context, the content and representation of
328 gratitude climate in the sports domain were specifically described, drawing from previous
329 empirical studies (Hsu et al., 2020). For example, an item might state, "Everyone on our team is
330 grateful for the training resources we have." As a result, the Sports Team Grateful Climate
331 Questionnaire consisting of 9 items was developed (see Appendices).

332 After generating the 9 items, a panel of experts, comprising two psychology professors, one
333 sports psychology professor, and one sports pedagogy professor, was invited to review and
334 analyze each item in order to ensure content validity. Each expert independently rated the items
335 on a scale of 1 to 10, indicating the extent to which they believed each item aligned with the
336 concept of a grateful climate. To assess the content validity of the instrument, Kendall's W
337 statistic was employed, which is particularly suitable when utilizing an expert panel. The results
338 revealed a Kendall's W coefficient of .61 ($p < .05$), indicating that the 9 items of grateful climate

339 exhibit reasonable content validity (Weiler, 1995)¹. Thus, the primary validity of the Sports
340 Team Grateful Climate Questionnaire was examined.

341 **Phase Two (Exploratory Factor Analysis)**

342 **Participants and Procedures**

343 Phase two of the study received approval from the Institutional Review Board. Prior to
344 athlete training, a research assistant presented an informed consent form to the athletes in a
345 classroom setting, ensuring that no coach was present during this process. Participants'
346 confidentiality and anonymity were safeguarded, as only the research team had access to the
347 responses, with no identifiable information available. All respondents completed the
348 questionnaire and received compensation in the form of 100 New Taiwan dollars (NTD),
349 equivalent to approximately 3 USD, in the form of gift vouchers.

350 A total of 411 adolescent athletes from various sports were recruited for the study. Seven
351 athletes who provided incomplete data were excluded, resulting in a final sample of 404
352 respondents ($N = 404$). Among these participants, there were 137 male athletes and 267 female
353 athletes, with a mean age of 15.22 years ($SD = 0.44$). On average, athletes had a sport tenure of
354 4.80 years ($SD = 2.82$, three respondents did not report their sport tenure), and their average daily
355 training time was 4.36 hours ($SD = 1.22$, two respondents did not report their average training
356 time), with training taking place approximately 5.71 days per week ($SD = 0.64$).

357 In terms of the participants' highest level of competition, 66.1% ($N = 267$) reported
358 competing at the national level, while 18.1% ($N = 73$) competed at the regional level, 2.7% ($N =$
359 11) at the international level, and 0.2% ($N = 1$) at the Asian level. Additionally, 12.9% ($N = 52$)
360 of the participants did not compete at any reported level or did not provide information regarding
361 their level of competition.

362 The athletes represented a variety of sports majors, including handball ($N = 4$), woodball
363 ($N = 4$), track and field ($N = 63$), korfbal ($N = 19$), gymnastics ($N = 3$), wrestling ($N = 18$),
364 soccer ($N = 17$), tug of war ($N = 8$), judo ($N = 32$), archery ($N = 30$), shooting ($N = 24$), boxing
365 ($N = 2$), table tennis ($N = 12$), volleyball ($N = 9$), modern pentathlon ($N = 1$), baseball ($N = 12$),
366 swimming ($N = 7$), taekwondo ($N = 58$), soft tennis ($N = 1$), kendo ($N = 3$), rugby ($N = 18$),
367 fencing ($N = 4$), weightlifting ($N = 8$), softball ($N = 18$), and basketball ($N = 28$).

368 **Measurements**

369 *Grateful Climate*

370 The 9-item Sports Team Grateful Climate Questionnaire developed from phase one was
371 used to measure the gratitude climate in the sports teams with a Likert scale from 1 (strongly
372 disagree) to 6 (strongly agree).

373 **Data Analysis**

374 Exploratory factor analysis (EFA) was conducted to examine the initial item quality and
375 factor structure of the grateful climate in sports teams, following the recommendations of
376 Fabrigar et al. (1999). The factor solutions were generated using SPSS 20.0 software, employing
377 a Promax rotation. The choice of an oblique promax rotation method was made to allow for
378 significant positive correlations among the potential factors (Gorsuch, 1983).

379 To determine the appropriate number of factors and attain a satisfactory factor solution, the
380 Kaiser criterion (Gorsuch, 1983; Harman, 1976) and scree tests (Cattell, 1966) were employed.
381 These methods aided in estimating the number of factors required to achieve an optimal factor
382 structure.

383 **Results**

384 **Attrition Analysis**

385 According to Ployhart and Vandenberg's (2010) approach, the analysis revealed no
386 significant differences between the two groups in terms of gender ($\chi^2 = 1.19, df = 1, p > .05$),
387 sport tenure ($t = 0.55, df = 405, p > .05$), daily training hours ($t = -1.05, df = 407, p > .05$), and
388 weekly training days ($t = 0.15, df = 408, p > .05$). However, a significant difference was
389 observed in terms of age between respondents and non-respondents ($t = 10.18, df = 403, p < .05$).
390 This discrepancy may be attributed to the unequal sample sizes between the two groups. Overall,
391 it is suggested that the non-response in the data was not systematic. To further examine the factor
392 validity of the Sports Team Grateful Climate Questionnaire, an exploratory factor analysis was
393 conducted, as presented below. **Exploratory Factor Analysis**

394 The findings from the exploratory factor analysis are presented in Table 1. The skewness
395 values (-0.68 to -0.99) and kurtosis values (0.01 to 0.81) for all indicators were below 2.0 and
396 7.0, respectively, indicating that the current data did not violate the assumption of multivariate
397 normal distributions (West et al., 1995). Consequently, an exploratory factor analysis using the
398 maximum likelihood estimation method was conducted.

399 The results of the final model indicated that a one-factor solution was recommended, as all
400 items loaded onto a single factor. This conclusion was supported by the scree plot tests (Cattell,
401 1966), which demonstrated that the eigenvalues for the first factor (6.425) were substantially
402 higher than those for the other factors, which were all below 1 (Gorsuch, 1983; Harman, 1976).
403 The Cronbach's alpha coefficient for the one-factor solution was .95, indicating high internal
404 consistency. Therefore, the one-factor solution provided the maximum number of stable and
405 reliable factors for the Sports Team Grateful Climate Questionnaire. All nine items exhibited
406 factor loadings ranging from .74 to .88, indicating strong validity. Therefore, all items were
407 retained in the final questionnaire.

408 -----

409 Insert Table 1

410 -----

411 **Phase Three (Multilevel Confirmatory Analysis, Nomological and Incremental Validity)**

412 **Participants and Procedures**

413 The data for this study were collected as part of a larger independent project supervised by
414 the first author². The study received approval from the Institutional Review Board, and the data
415 collection procedures were identical to those implemented in phase two.

416 Four hundred sixty-six adolescent athletes were initially recruited from various sports, and
417 data from 431 athletes representing 56 teams who provided complete data at two time points
418 were included in the analysis. The distribution of athletes across sports was as follows: handball
419 ($N = 5$), woodball ($N = 3$), track and field ($N = 59$), korfbal ($N = 26$), rowing ($N = 3$), wrestling
420 ($N = 9$), soccer ($N = 6$), tug of war ($N = 7$), martial arts ($N = 3$), judo ($N = 34$), archery ($N = 22$),
421 shooting ($N = 16$), table tennis ($N = 20$), volleyball ($N = 16$), baseball ($N = 21$), swimming ($N =$
422 10), taekwondo ($N = 60$), soft tennis ($N = 3$), kendo ($N = 6$), billiards ($N = 6$), rugby ($N = 23$),
423 fencing ($N = 11$), weightlifting ($N = 4$), softball ($N = 23$), and basketball ($N = 35$). The team sizes
424 ranged from three to twenty-six athletes, with a mean of 8 athletes per team.

425 In total, the sample consisted of 310 male athletes and 121 female athletes, with a mean age
426 of 15.84 years ($SD = 0.64$). The average duration of sport participation was 4.69 years ($SD =$
427 2.53), and athletes reported an average training time of 4.17 hours per day ($SD = 1.24$) and 5.56
428 days per week ($SD = 0.63$). Regarding the highest level of competition, 66.6% of athletes ($N =$
429 287) reported competing at the national level, while 19.2% ($N = 83$) competed at the regional
430 level, 5.1% ($N = 22$) at the international level, and 2.1% ($N = 9$) at the Asian level. Additionally,

431 7.0% ($N = 30$) of athletes either did not compete at any level or did not report their competition
432 level.

433 **Measurements**

434 *Grateful Climate*

435 The 9-item Sports Team Grateful Climate Questionnaire measured in the previous phase
436 was used.

437 *Autonomy Support*

438 Coach autonomy support was assessed using the 6-item short-form scale of the Sport
439 Climate Questionnaire (SCQ) developed by Deci (2001). The Chinese translation of the short
440 version of the SCQ was used in this study, which was provided by Chang et al. (2017). Previous
441 research conducted with Chinese participants has demonstrated acceptable validity and reliability
442 of the Chinese SCQ (Chang, 2016; Lin, 2010). The participants in the current study rated the
443 items on a 6-point Likert scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*).
444 Cronbach's alpha for this measure was .91.

445 *Subjective Vitality*

446 A revised 6-item version of the subjective vitality scale, developed by Bostic et al. (2000), ,
447 was used to assess the athletes' subjective vitality. Previous studies conducted with Chinese
448 populations, including Chinese adolescent athletes, have reported acceptable reliability and
449 validity of this scale (Chen et al., 2013; Ling et al., 2015; Wong et al., 2014) as well as with
450 Chinese adolescent athletes (Chang et al., 2018). Participants rated the items on a 7-point Likert
451 scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Cronbach's alpha for this
452 measure was .89.

453 *Sports-specific Gratitude*

454 The Gratitude Questionnaire-Sport (GQ-S), a six-item measure developed by Chen and Kee
455 (2008) was employed in the present study to assess athletes' gratitude within the sports context.
456 Previous research conducted with Chinese populations has demonstrated the reliability and
457 incremental validity of this scale (Chen & Chang, 2017). The GQ-S consists of a single factor.
458 Participants rated the items on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7
459 (*strongly agree*). Cronbach's alpha for this measure was .82.

460 **Data Analysis**

461 A multilevel confirmatory factor analysis was conducted to test the factor validity of the
462 grateful climate, considering its nested data structure. Mplus 7 software (Muthén & Muthén,
463 2015) was used for the analyses. Multilevel confirmatory factor analysis is particularly suitable
464 for analyzing nonindependent data, as it allows for the partitioning of the total sample covariance
465 matrix into within-group and between-group covariance matrices (Hox, 2002). These covariance
466 matrices were utilized to examine the factor structure of the Sports Team Grateful Climate
467 Questionnaire at both the individual and group levels.

468 Before conducting the multilevel confirmatory factor analysis, an intraclass correlation
469 coefficient (ICC) was calculated to determine the appropriateness of using multilevel analysis.
470 The ICC assesses the proportion of between-group variance compared to the total variance (Dyer
471 et al., 2005; Hox, 2002). A threshold of ICC value larger than 0.1 is typically considered
472 necessary to justify the adoption of a multilevel confirmatory factor analysis.

473 In the current study, the maximum likelihood estimation method was chosen as the values
474 of skewness (-1.03 ~ -0.71) and kurtosis (-0.08 ~ 1.01) for all indicators were below 2.0 and 7.0,
475 respectively (Curran et al., 1996). Goodness-of-fit indices for the models were selected based on
476 the recommendations of Hu and Bentler (1999). Specifically, model fit was evaluated using the

477 χ^2 likelihood ratio statistic, the comparative fit index (CFI > .90), the root mean square error of
478 approximation (RMSEA < .08), and the standardized root mean square residual (SRMR < .08).

479 Convergent validity was assessed by calculating Cronbach's alpha, Rho, and average
480 variance extracted (AVE) values. Nomological validity was examined by conducting Pearson's
481 correlation coefficient to test the relationship between the grateful climate of sports teams and
482 the related variables.

483 Results

484 Attrition analysis

485 According to the perspective of Ployhart and Vandenberg (2010) , the results indicated that
486 there were no significant differences between the two groups in terms of gender ($\chi^2 = 1.03$, $df =$
487 1 , $p > .05$), age ($t = 1.55$, $df = 460$, $p > .05$), sport tenure ($t = 1.23$, $df = 450$, $p > .05$), daily
488 training hours ($t = 0.67$, $df = 462$, $p > .05$), and weekly training days ($t = 1.28$, $df = 458$, $p > .05$).
489 These findings suggest that the nonresponses in the current data were not systematic.
490 Subsequently, multilevel confirmatory factor analysis was conducted to examine the factor
491 validity of the Sports Team Grateful Climate Questionnaire.

492 Multilevel CFA

493 Table 2 presents the ICC values for all items (GC1-GC9), which are greater than 0.1,
494 indicating that more than 10% of the variance in the data is attributable to group responses. Thus,
495 multilevel confirmatory factor analysis is an appropriate approach to assess the factor validity
496 (Dyer et al., 2005; Hox, 2002). The initial multilevel confirmatory factor analysis demonstrated
497 satisfactory fit: $\chi^2(df) = 219.76 (54)$, RMSEA = .08, SRMR within = .03, SRMR between = .05,
498 CFI = .94. Convergent validity was then examined at both the within-level and between-level.
499 Table 2 presents the factor loadings, Cronbach's alpha, rho, and AVE values.

500 At the within-person level, the factor loadings of all items ranged from .78 to .89.
501 Cronbach's alpha was .96, Rho value was .96, and AVE value was .72. At the between-person
502 level, the factor loadings of all items ranged from .888 to .998. Cronbach's alpha was .98, Rho
503 value was .99, and AVE value was .94. These results from the multilevel analysis provide strong
504 evidence of convergent validity, as indicated by the AVE and reliability coefficients, for both the
505 within-level and between-level models.

506 -----
507 Insert Table 2
508 -----

509 **Nomological and Incremental Validity**

510 At the within-person level (see Table 3), the grateful climate demonstrated significant
511 positive correlations with autonomy support ($r = .41, p < .01$), subjective vitality ($r = .37, p <$
512 $.01$), and sports-specific gratitude ($r = .42, p < .01$). At the between-person level (see Table 4),
513 the grateful climate also showed significant positive correlations with autonomy support ($r = .50,$
514 $p < .01$), subjective vitality ($r = .41, p < .01$), and sports-specific gratitude ($r = .52, p < .01$).
515 These findings suggest that while the grateful climate is related to these concepts, it is distinct
516 and separate from them

517 -----
518 Insert Tables 3 and 4
519 -----

520 In addition, to examine the unique predictive power of the grateful climate in the within-
521 level and between-level models while accounting for the shared variance with sports-specific
522 gratitude, partial correlation analyses were conducted (see Table 5). In the within-person model,

523 the results revealed that the grateful climate was uniquely and positively associated with
524 autonomy support ($r = .29, p < .01$) and subjective vitality ($r = .24, p < .01$) after controlling for
525 sports-specific gratitude. Similarly, in the between-person model, the grateful climate exhibited
526 significant and unique correlations with autonomy support ($r = .41, p < .01$) and subjective
527 vitality ($r = .27, p < .01$) after adjusting for sports-specific gratitude. These findings indicate that
528 the grateful climate provides incremental validity, as it explains a significant amount of unique
529 variance in sports-specific outcomes at both the within-person and between-person levels, even
530 when considering the influence of sports-specific gratitude.

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532

Insert Table 5

533

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Discussion

535 The primary aim of the current study was to develop a reliable and valid measure for assessing
536 the grateful climate of sports teams. In phase one, a set of nine items was generated based on
537 gratitude-related theory, the referent-shift consensus model (Chan, 1998), cultural beliefs, and
538 previous empirical research on gratitude in the sports domain. The content validity of these items
539 was evaluated by a panel of experts, and they were utilized to construct the Sports Team Grateful
540 Climate Questionnaire. In phase two, exploratory factor analysis confirmed the one-factor
541 structure of the questionnaire, providing initial support for its construct validity.

542 Subsequently, in phase three, a multilevel confirmatory factor analysis was conducted,
543 demonstrating good fit between the Sports Team Grateful Climate Questionnaire and the
544 collected data. Additionally, satisfactory values of Cronbach's alpha, Rho, and AVE were
545 observed, indicating strong convergent validity at both the within-level and between-level

546 models. Furthermore, at the between-level model, the grateful climate was positively correlated
547 with autonomy support and subjective vitality. Notably, even after controlling for sports-specific
548 gratitude in the between-level model, the grateful climate of sports teams remained significantly
549 associated with autonomy support and subjective vitality, thereby supporting its incremental
550 validity. In conclusion, this study contributes to the existing literature on gratitude by introducing
551 a reliable and valid instrument for assessing gratitude at the team level. The Sports Team
552 Grateful Climate Questionnaire offers a valuable tool for researchers and practitioners interested
553 in investigating the role of gratitude within sports teams.

554 Since the introduction of the multilevel model of gratitude by Fehr et al. (2017) , there has
555 been a lack of appropriate measurement tools to capture the higher-level phenomenon of
556 gratitude. Recognizing this gap, our study aimed to address this issue by developing the Sports
557 Team Grateful Climate Questionnaire. While our approach differs somewhat from the original
558 concept of collective gratitude, we adopt a sociocultural perspective to examine higher-level
559 gratitude. In our study, we did not directly aggregate individuals' scores of sport-specific
560 gratitude as a higher-level construct. Instead, we focused on measuring the shared perception of
561 cultural norms related to gratitude that are embedded in individuals' minds, which we consider
562 representing a grateful climate. Consequently, the Sports Team Grateful Climate Questionnaire
563 assessed the shared perception of grateful norms among athletes and aggregated these items to
564 reflect higher-level constructs. We believe that this approach is more suitable for the population
565 we surveyed.

566 However, it is important to note that we did not claim that the referent-shift consensus
567 model outperformed the direct consensus model in measuring higher levels of gratitude. Further
568 research with a cross-cultural focus is necessary to determine the most appropriate solution for

569 capturing higher-level gratitude phenomena. In summary, our study addresses the lack of suitable
570 measurement tools for assessing higher-level gratitude. By adopting a sociocultural perspective
571 and developing the Sports Team Grateful Climate Questionnaire, we provide a valuable
572 contribution to the field. Nonetheless, future research is needed to explore and refine the
573 measurement of higher-level gratitude across different cultural contexts.

574 Empirically, a diverse sample of athletes from various sports teams was recruited to
575 enhance the representativeness of the study. The results of the exploratory factor analysis
576 indicated that the 9 items of the Sports Team Grateful Climate Questionnaire converged into a
577 single factor, with all factor loadings exceeding the recommended threshold of .70 (Hair et al.,
578 2006). Additionally, the calculated Cronbach's alpha coefficient of .95 demonstrated excellent
579 internal consistency, providing support for the questionnaire's validity and reliability. However,
580 given our objective to capture the higher-level psychological construct, considering the nested
581 nature of the data within teams, we conducted multilevel confirmatory factor analysis to further
582 examine the factor structure.

583 The results of the multilevel confirmatory factor analysis indicated that the proposed model
584 exhibited good fit with the data at both the within and between levels. However, it is noteworthy
585 that more than 10% of the variance in the data originated from group responses, suggesting that
586 the grateful climate of sports teams is a collective phenomenon shaped by the team itself. Thus, it
587 is inappropriate to solely consider the grateful climate as an individual perception; rather, it
588 should be understood as a shared perception among team members (Aguinis et al., 2013; Chen
589 et al., 2005). Consequently, averaging individuals' scores to represent a higher-level construct,
590 such as the grateful climate of a sports team, may not be suitable. Instead, the aggregation
591 approach employed in the current study is deemed a more appropriate method. These findings

592 lend support to the argument that researchers should carefully consider the levels of constructs
593 when adapting theories, establishing concepts, and developing measurements (Ballard et al.,
594 2019; González-Romá & Hernández, in press) , and the Sports Team Grateful Climate
595 Questionnaire effectively addresses this requirement.

596 In terms of nomological validity, our findings revealed positive associations between the
597 grateful climate and autonomy support, subjective vitality, and sport-specific gratitude at both
598 the individual and team levels. Specifically, individuals who perceived a higher level of grateful
599 climate within their team also reported greater perceptions of autonomy support, higher levels of
600 subjective vitality, and stronger sports-specific gratitude. Furthermore, teams characterized by a
601 higher degree of grateful climate were associated with greater levels of autonomy support and
602 subjective vitality compared to teams with a lower level of grateful climate. These results align
603 with theoretical expectations (Fenton et al., 2014; Fredrickson, 2003). It is important to note that
604 our conceptualization of the grateful climate of sports teams primarily focuses on capturing
605 higher-level phenomena within the team context. Therefore, demonstrating the satisfactory
606 incremental validity of the grateful climate construct at the team level becomes particularly
607 significant.

608 To further examine the relationship between the grateful climate of sports teams and related
609 variables at the team level, we conducted partial correlations while controlling for sport-specific
610 gratitude. The correlation coefficients slightly decreased (from .50 to .41 for autonomy support
611 and from .41 to .27 for subjective vitality) but remained significant, supporting the incremental
612 validity of the grateful climate construct within the sports team context. These findings suggest
613 that the grateful climate may be influenced by situational factors and that subjective vitality can

614 be fostered through grateful interactions within teams, beyond the individual team members'
615 levels of sports-specific gratitude.

616 Our results may appear to conflict with those of Fehr et al. (2017), who proposed that a
617 grateful climate should be operationalized by aggregating the individual team members' trait
618 gratitude. However, it is important to note that our conceptualization of the grateful climate as a
619 unique construct differs from their approach. We adopted the consensus level term as the subject
620 term to capture the participants' perception of another member's gratitude within the team,
621 following the referent-shift model proposed by Chan (1998). Therefore, our results do not
622 contradict those of Fehr et al. (2017), as we offer a distinct perspective on measuring the grateful
623 climate. By providing preliminary evidence for quantifying the grateful climate within sports
624 teams, our study makes a significant contribution to the existing literature on gratitude.

625 **Implications and limitations**

626 In terms of practical implications, our study contributes to the field by being one of the first
627 to develop a valid and reliable measurement tool specifically designed to assess the grateful
628 climate of sports teams. This opens up new avenues for investigating the antecedents and
629 consequences of gratitude beyond the individual level. We now have the opportunity to explore
630 whether teams that possess a grateful climate experience higher levels of happiness and well-
631 being. Additionally, we can uncover psychological processes that may be similar to or different
632 from those observed at the individual level.

633 For instance, Chen et al. (2015) discovered a positive relationship between athletes' trait
634 gratitude and life satisfaction, mediated by perceived team cohesion. However, in their study,
635 team cohesion was operationalized as an individual's perception rather than as a team-level
636 construct (Carron & Brawley, 2000; Eys & Brawley, 2018). Therefore, it would be intriguing to

637 investigate whether grateful teams exhibit higher levels of cohesiveness and, consequently,
638 contribute to athletes' well-being. In summary, our study offers a multilevel perspective that
639 advances gratitude research and provides valuable insights for practitioners in the sports domain.

640 Several limitations of our study should be acknowledged. Firstly, all the measures employed
641 in our study were based on self-reports, which introduces the possibility of common method bias
642 (Lindell & Whitney, 2001). To enhance the validity of our findings, future research should
643 incorporate multiple data sources, such as obtaining ratings from other team members or
644 coaches, to provide a more comprehensive validation of the results. Additionally, the cross-
645 sectional design of our study restricts our ability to establish causal relationships among the
646 variables. Conducting longitudinal studies would be valuable in examining the temporal
647 dynamics and directionality of the relationships.

648 Secondly, while autonomy support and subjective vitality were chosen to examine the
649 nomological validity of the grateful climate, they may not fully capture the complete range of
650 variables relevant to the construct. The absence of negative indicators limits our understanding of
651 the broader aspects of the grateful climate. As our study was exploratory in nature, future
652 research should consider incorporating multiple indicators and a more comprehensive set of
653 variables to further investigate the nomological network of the grateful climate.

654 Lastly, we did not assess the cross-situational invariance of the Sports Team Grateful
655 Climate Questionnaire. It would be valuable to examine whether our measurement tool can be
656 applied in different contexts, such as work settings with slight modifications. This line of
657 investigation would contribute to understanding the generalizability and robustness of the
658 questionnaire across diverse units and situations.

659 **Conclusion**

660 In the present study, we aimed to advance the understanding of gratitude by developing a
661 reliable and valid tool to measure the grateful climate of sports teams. Drawing on the work of
662 Fehr et al. (2017) and the referent-shift model (Chan, 1998), we employed a multi-step process,
663 including item development, expert evaluation, exploratory factor analysis, multilevel
664 confirmatory factor analysis, and assessments of nomological and incremental validity. Through
665 these rigorous procedures, we successfully quantified the grateful climate using the Sports Team
666 Grateful Climate Questionnaire.

667 Our study represents a significant contribution to the gratitude literature as it expands the
668 conceptualization of gratitude beyond the individual level to the team level. By developing a
669 measurement tool that captures the unique characteristics of the grateful climate in sports teams,
670 we open new avenues for research exploring the antecedents, consequences, and dynamics of
671 gratitude within team contexts. This broader perspective sheds light on the collective aspects of
672 gratitude and allows for a more comprehensive understanding of its implications.

673 Overall, our study fills an important gap in the literature by providing a reliable and valid
674 instrument to measure the grateful climate of sports teams. This advancement contributes to the
675 field of gratitude research and offers valuable insights for future investigations in team settings.
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Appendices

- 1 在我們團隊中，成員都覺得飲水思源是重要的事情
Everyone on our team thinks that being grateful and expressing gratitude is important.
- 2 在我們團隊中，成員對現在擁有的訓練資源都心懷感激
Everyone on our team is grateful for the training resources we have.
- 3 團隊能有現在的表現，大家都覺得前人的努力功不可沒
Everyone on our team thinks that our accomplishments would not have been possible without the efforts of our predecessors.
- 4 在我們團隊中，成員都是互相幫忙不求回報地
Everyone on our team helps each other without expecting anything in return.
- 5 在我們團隊中，大家都覺得懂得感恩是重要的。
People on our team think that being grateful and expressing gratitude is important.
- 6 多年後如果有機會，大家都會盡力回報團隊的栽培
If there are opportunities in the future for them to do so, everyone will do their best to repay the team for their training.
- 7 在這個團隊中，成員經常對他人的貢獻表示感謝
On this team people always express gratitude for the contributions of others.
- 8 對於前輩們建立的基礎，大家都是滿懷感謝的。
People are grateful for the foundation that our predecessors have built.
- 9 對於來自各方對團隊的支持，大家都十分感恩。
People are grateful and express gratitude for the support given to our team from others.

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Footnotes

- 801 1. The English version of the grateful climate at sport measure utilized in this study has not
802 been validated. Therefore, further research is needed to validate its psychometric properties
803 in an English-speaking context.
- 804 2. The data for phase three of this study were collected as part of a larger project, which
805 involved six waves of data collection over a three-year period. The project was supervised
806 and funded by the first authors. In the current study, the second wave of variables from the
807 project was utilized. It is important to note that the Gratitude Questionnaire-Sport used in
808 this study has been reported in another independent article that aims to capture the growth
809 of athlete's gratitude. However, it is crucial to highlight that the two studies contribute to the
810 literature on gratitude in different domains, ensuring their originality. Furthermore, neither
811 the analysis nor the findings presented in this study have been published in any prior work.

Table 1

Descriptive Statistics, Factor Loadings, Reliability Coefficients of Exploratory Factor Analysis
(*N* = 404)

Item	<i>M</i>	<i>SD</i>	Skewness	Kurtosis	λ	% of Variance	α
Item 1	4.56	1.24	-0.69	0.18	.78	67.90	.95
Item 2	4.58	1.27	-0.68	0.01	.84		
Item 3	4.72	1.20	-0.71	0.02	.74		
Item 4	4.57	1.30	-0.78	0.13	.77		
Item 5	4.68	1.31	-0.92	0.34	.88		
Item 6	4.66	1.23	-0.76	0.11	.84		
Item 7	4.61	1.26	-0.81	0.25	.85		
Item 8	4.74	1.24	-0.99	0.81	.85		
Item 9	4.85	1.18	-0.94	0.47	.86		

Table 2

Descriptive Statistics, Interclass Correlation Coefficients, Factor Loadings, Reliability Coefficients, and AVE of Multilevel Confirmatory Factor Analysis (N = 431)

Item	<i>M</i>	<i>SD</i>	Skewness	Kurtosis	ICCs	λ		α		Rho		AVE	
						Within- level	Between -level	Within- level	Between- level	Within -level	Between- level	Within- level	Between- level
Item 1	4.63	1.17	-0.73	0.20	.13	.78	.988	.96	.98	.96	.99	.72	.94
Item 2	4.69	1.24	-0.83	0.33	.20	.86	.996						
Item 3	4.80	1.13	-0.89	0.72	.15	.78	.957						
Item 4	4.55	1.31	-0.76	-0.01	.13	.82	.899						
Item 5	4.70	1.23	-0.85	0.21	.13	.89	.997						
Item 6	4.70	1.18	-0.84	0.51	.11	.89	.998						
Item 7	4.63	1.23	-0.71	-0.08	.12	.89	.998						
Item 8	4.78	1.17	-0.87	0.42	.10	.86	.888						
Item 9	4.90	1.12	-1.03	1.01	.14	.86	.997						

*Table 3**Assessment of Criterion Validity in the Within-Level Model (N = 430 ~ 431)*

	<i>N</i>	<i>M</i>	<i>SD</i>	1	2	3
1. Gratitude climate	431	4.71	1.05	--		
2. Autonomy support	431	4.35	1.08	.41**	--	
3. Subjective vitality	430	4.77	1.18	.37**	.35**	--
4. Sports-specific gratitude	430	5.68	1.00	.42**	.40**	.41**

* $p < .05$, ** $p < .01$

*Table 4**Assessment of Criterion Validity in the Between-Level Model (N = 56)*

	<i>N</i>	<i>M</i>	<i>SD</i>	1	2	3
1. Gratitude climate	56	4.66	0.58	--		
2. Autonomy support	56	4.37	0.55	.50**	--	
3. Subjective vitality	56	4.72	0.52	.41**	.08	--
4. Sports-specific gratitude	56	5.65	0.47	.52**	.31*	.37**

* $p < .05$, ** $p < .01$

1 *Table 5*2 *The Partial Correlations among the Variables in the Within-Level Model and Between-Level*3 *Model*

	Gratitude climate (within model)	Gratitude climate (between model)
1. Autonomy support	.29**	.41**
2. Subjective vitality	.24**	.27*

4 * $p < .05$, ** $p < .01$

5 Note: Sports-specific gratitude was controlled in both within-level and between-level model.