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**Mapping cognitive positions on fear of retirement  
among sport professional handball players**

Eric Fruchart<sup>1</sup>, Cantisano Nicole<sup>2</sup>

University of Perpignan Via Domitia<sup>1</sup>, LIPSEM France

University of Toulouse Jean Jaurès<sup>2</sup>, CERPPS, France

### **Abstract**

Not all professional athletes experience retirement from sport in the same way, and the consequences of retirement can vary from one individual to another. The objective of the present study was to map the way in which male professional handball players cognitively integrated four information cues (social support, career achievements, preparation for retirement, and sports practice after retirement as a professional) when judging the degree of fear of retirement from professional sport. A total of 146 participants rated their judgment of fear of retirement from professional sport in 54 scenarios built from all possible combinations of these information cues. By performing cluster analyses and analyses of variance, four clusters were identified: “No Fear When Fully Prepared”; “Less Fear”; “Undetermined”; “Fear Always Present”. When judging retirement from professional sport, professional handball players had different positions. Practitioners should take account of these differences when helping athletes to prepare for or deal with retirement from professional sport.

Keywords: individual differences, judgment, fear, retirement, handball

Mapping cognitive positions on fear of retirement among professional handball players

*Fear of sports retirement*

Retirement from elite sport is a transition that all professional athletes will face (Stambulova et al., 2020). Sports retirement is considered as a career normative transition in the sense that this period derives from athletes' logical career development and can be relatively predictable (Stambulova & Wylleman, 2014). To best support professional athletes through this transition, it is necessary to understand their associated feelings (Menke & Germany, 2019). Not all athletes experience the end of their careers in the same way, and the consequences can vary from one individual to another (Carapinheira et al., 2018). The literature on retirement from sports has identified two qualitatively contrasting positions regarding how individuals experience this career transition: as athletes approach the end of their careers, their reactions can be either positive or negative (Stephan, 2005). Studying sports retirement is important given that previous investigations have shown that withdrawal from professional or high-performance sport can result in negative psychological, emotional, social and physical consequences (cf. for a review, Park et al., 2013).

In a positive transition, the end of a career in professional sport is viewed as a "rebirth" or "flourishing"; the athlete has no difficulty in understanding the transition, he/she has feelings of pleasure and satisfaction and does not develop negative emotions like stress or fear (Knights et al., 2019). Furthermore, a supportive social environment has been linked to a positive outcome in sport retirement (Knights et al., 2019). In contrast, the negative perspective of sport retirement emphasizes the difficulties the athlete might face and is associated with doubt, stress, fear, and loss of self-esteem (Torregrosa et al., 2015). The considerations, judgments, fears and emotions felt as the end of the sports career approaches might vary from one athlete to another.

Fear of retirement is characterized as an unknown phenomenon for the future retiree, and constitutes a source of anxiety caused by the end of his/her actual life, activities, habits or behaviour (Principi et al., 2020). In the sports domain, fear of retirement from professional sport has never been specifically studied by researchers. Therefore, in this domain, the fear of sports retirement and its determinants are not clearly defined. To fill this gap, our study aimed to explore the determinants of fear of sports retirement. Although all the data in literature points out the positive vs negative transition dichotomy, the cognitive processes involved in the judgment of “end-of-career fear” in sport has not been investigated. Our study intends to fill this existing gap while deepening the simplistic contradiction between positive and negative feelings related to the end of a sports career. The study targets the identification of various fear positions concerning sports retirement and aims to reveal the cognitive structure of fear among athletes (i.e. how they mentally integrate information cues for judging fear). A number of questions arise. How is this fear cognitively constructed? Are there inter-athlete differences concerning cognitive positions on fear of retirement from professional sport?

### ***Potential determinants of fear of sports retirement***

Based on previous data on judgments of fear on the one hand, and on retirement from professional sport, on the other hand, a multitude of determinants could influence the fear of sports retirement. Therefore, the following four factors were selected (over others) given that they refer to various theoretical approaches in career transitions literature such as the social cognitive career theory (Lent et al., 1994) and the continuity theory (Atchley, 1999).

The first factor was social support. It is known that an athlete’s social (non-sporting) environment (i.e. family and friends) has a positive impact on career transitions. Indeed, the presence of social support (e.g. provision of information, having a network, or receiving support from family or friends) is an effective strategy for adapting to the athlete’s new life (Carapinha et al., 2018). In particular, emotional support helps athletes to cope with

challenging feelings and difficulties (Park et al., 2013). Lastly, social support has a proven, positive effect on people's judgments of fear (Cantisano et al., 2018). Social support relates psycho-social theoretical perspectives that emphasize the importance of social expectations and social behaviour. In life transitions such as career transition, athletes may feel supported by the social environment (Elder et al., 2003). The fear of sports retirement could be influenced by the presence of social support.

The second factor was the level of career achievement. Career achievement refers to goal-oriented theories such as the social cognitive career theory (Lent, Brown, & Hackett, 1994). This perspective outlines the necessity for individuals to achieve their career goals as an essential element of career satisfaction. Therefore, the fear of sports retirement could be influenced by career achievement. For instance, it is known that achieving sporting objectives is positively correlated with the quality of a career transition (Park et al., 2013).

Accomplishments in sports give athletes more self-esteem or self-identity. In contrast, a lack of success leads to psychosocial difficulties and negative evaluations of adaptation to retirement from sport (Park et al., 2013). In another fear judgment domain, an individual's life accomplishments had a significant impact on participants' fear of death judgments (Cantisano et al., 2020).

The third factor was the degree of preparation for retirement. A high degree of preparation for the end of a sporting career enables an athlete to plan ahead and reduces emotional difficulties (Stephan, 2005). Pre-retirement planning is widely acclaimed as an effective mean of reducing negative emotions and improving the quality of retirement from sport (Park et al., 2013). Moreover, preparation of retirement is linked to the rational choice theory (Hatcher, 2003). In this approach, people are considered as rational decision makers who will prepare retirement to live this transition as well as possible. The preparation of retirement is central in this approach and can influence the fear of sports retirement.

The fourth factor was sports practice after retirement as a professional. Sport is a large part of a professional athlete's life. In response, the athlete develops his or her own routines and lifestyle habits around it (Stephan, 2003). Hence, a complete stop in sports activity constitutes a drastic life change that can induce negative emotions, and can be anxiety-provoking (Schwenk et al., 2007). Torregrosa et al. (2004) suggested that moving to amateur sport can help an athlete to cope with the end of his/her professional career. In the case of professional athletes, sports practice after retirement can be related to activity theory and continuity theory. These theories have been employed to understand the retirement transition. Activity theory (Havighurst, 1961) suggests that retirement will be better accepted by individuals if they practice new activities and remain socially engaged in their new activities (e.g., sports). Continuity theory (Atchley, 1999) emphasizes the extent to which individuals remain the same after retirement as they were before (i.e. in this study, a sportsman). Therefore, it is plausible to assume that sports practice after retirement as a professional can influence the fear of sports retirement.

#### ***Cognitive integration of determinants regarding fear of sports retirement***

In the field of psychology, information integration theory has been used to study individuals' conceptualizations of fear. Anderson's cognitive theory on information integration (Anderson, 2008) highlights the mental processes linked to human judgments. The theory highlights the information integration process, i.e. the manner in which individuals cognitively integrate different information cues and then judge a situation (e.g., acceptability judgments or judgments regarding risk perception). Given that thoughts and actions are goal-oriented and depend on the integration of different items of information (Anderson, 2008), this framework focuses on the processes through which information cues of various types may be integrated into a judgment. This theoretical framework has been applied in many areas of psychology (Anderson, 2008). Researchers use this theory to understand the manner in which

people cognitively combine or integrate several information cues when judging a situation or making a decision. Furthermore, while employing this approach, it is possible to map individuals' judgments into various positions, which has been applied in various domains, such as sports psychology (Fruchart 2021; Fruchart et al., 2019; Fruchart et al., 2020) and health psychology (Cantisano et al., 2020).

In the health domain, for instance, Cantisano et al. (2020) investigated the conceptualisation of the fear of death from a lay person's perspective. The study's participants were confronted with 48 scenarios depicting a terminally ill elderly patient and then had to estimate the patient's fear of death in each scenario. The scenarios were built from combinations of five within-subject factors: belief in God, the presence of social support, the person's life accomplishment, the persistence of unresolved conflicts with family members, and compliance with the person's end-of-life wishes. A cluster analysis revealed four different positions on fear of death: *Not much fear*, *Depends on circumstances*, *Fear always present*, and an *Undetermined position*. The participant's position on fear of death was associated with certain sociodemographic characteristics. Cantisano et al. (2020)'s findings suggested that people differ in their judgments of fear and that these judgments can be linked to their sociodemographic characteristics.

Information integration theory has also been implemented in the assessment of sporting career transitions. Fruchart and Mullet (2012) explored the way in which professional handball players integrated five factors when deciding whether to move from one team to another: the current level of satisfaction with the present team, the attractiveness of the other team, the perceived probability of being hired, the presence of a network of friends, and the other team's location/wage differential. The study's participants considered all of these factors in their judgments. Fruchart and Mullet (2012) suggested that individual differences in judgment profiles (the way in which athletes integrate the various factors in sporting career



transitions) should be investigated. Indeed, their results showed that sporting career transitions could be investigated by applying information integration theory. The present study's rationale was, as professional handball players combine potential determinants (see above) when making a decision on a transition during their sporting career (Fruchart & Mullet, 2012), they might also do so when judging their fear of retirement from their sporting career.

The objective of the present study was to map handball players' positions according to the manner in which they cognitively combine the four above-mentioned information cues (social support, career achievements, preparation for retirement, and sports practice after retirement as a professional) when judging their fear of retirement from professional sport. We hypothesized that different qualitative positions regarding judgments of fear would emerge (Cantisano et al., 2020). More precisely, we hypothesized that we would find at least two positions, corresponding to the dichotomy between a positive perspective on the transition (i.e. no fear) and the negative perspective (i.e. fear) (Carapinha et al., 2018).

## **Method**

### ***Participants***

The study was conducted in France. Participants were 146 male professional handball players ( $M_{age} = 26.31$ ;  $SD = 4.58$ ) who voluntarily agreed to take part in the study. They had about 15 hours of training per week, and on average, they expected to practice 10 years as professional sportsmen in the future before retiring from their sports career. Participants did not receive any remuneration for their participation. One of the investigators contacted several professional clubs, explained the study, and asked players if they wished to participate. If the players agreed to participate, arrangements were made regarding where and when the experiment would take place.

### ***Material***

The material consisted of 54 vignettes containing a short story (a few lines of text), a

question, and a response scale. All stories depicted a male handball player at the end his professional career. The methodology employed to test IIT (Anderson, 2008) stipulates a requirement that factorial designs should emerge from the orthogonal crossing of all factors and their modalities, therefore, all possible combinations must be present. The 54 vignettes were composed according to a within-subject design with four factors (2 x 3 x 3 x 3): (a) whether social support was available or not (2 levels), (b) the athlete's sporting career achievements (low, intermediate, or high; 3 levels), (c) the athlete's preparation for retirement (not prepared, preparing now, or fully prepared; 3 levels), and (d) sports practice after retirement as a professional (no sport at all, an individual sport as an amateur, or a team sport as an amateur; 3 levels). The validity of these stories was first tested and confirmed by five ex-professional handball players who were familiar with sports retirement.

An example of a story was: "Sinvil has been a professional handball player for several years. At present, he does not have a professional contract and so feels that he is not performing as well as before. He is about to retire from professional handball. However, Sinvil believes that he has accomplished all the goals he had set himself as a professional athlete. He feels that he will not be forgotten and that his fellow players will continue to acknowledge his achievements. Sinvil has carefully prepared for his retirement from professional sport. He has chosen a new career and looks forward to starting a new job for which he has already obtained the necessary training. Furthermore, Sinvil knows that if he encounters professional problems or other types of problems, he can count on support from his loved ones (family and friends). Sinvil intends to give up sport completely."

Participants were then asked "If you were Sinvil, to what degree do you should be fearful about your retirement from professional sport?". Beneath each question was an 11-point response scale with "not at all fearful" indicated on the left and "very fearful" indicated on the right.

### ***Procedure***

The present study followed the ethical tenets of the Declaration of Helsinki, the ethical standards of the local institutional review board, and complied with Anderson's recommendations (Anderson, 2008) for this kind of research. Each participant was enrolled individually. Firstly, the investigator explained to the participant that (i) he was about to read a certain number of stories depicting a professional handball player at the end of his career and (ii) that for each story, he had to designate the degree to which he felt that the athlete might be worried about retirement from professional sport. Secondly, the participant was presented with 9 of the 54 stories (the familiarization phase). The 9 stories were chosen in order to expose the participant to the full range of stimuli. Each participant read each story and gave their rating. During this phase the participant was allowed to review their ratings and change them if wished. The main purpose of this phase was to enable the participant to develop a reference framework for the task. In the following experimental phase, all 54 stories were presented one by one to the participants in a random order. Participants rated each story at their own pace but during this phase they were no longer allowed to review or change their ratings. It took 30-40 minutes to complete the experiment. At the end, all participants filled out a questionnaire on sociodemographic variables.

### ***Data analysis***

In order to group participants into a small set of positions regarding their fear of retirement from professional sport, we performed a cluster analysis (raw data) on participants' ratings of each vignette (as used in other studies, e.g., Cantisano et al., 2020; Fruchart et al., 2019; Fruchart et al., 2020). In a two-step process, a hierarchical cluster analysis was followed by a non-hierarchical *k*-means cluster analysis. In the hierarchical cluster analysis, we used Ward's linkage method with squared Euclidian distance measure, the agglomeration schedule coefficients, and dendrogram to identify the number of clusters. We validated the

number of clusters in conducting a repeated-measures ANOVA, with the cluster membership as an inter-subject factor, information cues as independent variables, and the judgment of fear as dependent variables. Following the hierarchical cluster analysis, we performed a *k*-means cluster analysis by specifying the most appropriate cluster solution from the hierarchical stage.

After identifying the number of clusters, repeated-measures analyses of variance (ANOVAs) with the following design were performed on the data from each cluster: Social Support x Career Achievements x Preparation for Retirement x Sports Practice after Retirement as a Professional, 2 x 3 x 3 x 3. We used a repeated measures ANOVA because each participant was confronted with each scenario. As an important assumption of a repeated-measures ANOVA, the sphericity was verified by the Mauchly's test.

### ***Transparency and openness***

Data were analysed using STATISTICA 8. This study's design and its analysis were not pre-registered.

### **Results**

The hierarchical cluster analysis suggested a 4-cluster solution ( $K = 4$ ). A repeated-measure ANOVA and a post-hoc test were used to compare each cluster with the others. The Cluster variable was significant, ( $F(3,142) = 123.13; p < .001; \eta^2_p = .72$ ), and all Cluster x Factor interactions were significant ( $p < .05$ ): Cluster x Social Support,  $F(3,168) = 12.85$  ( $p < .001, \eta^2_p = .$ ); Cluster x Career Achievements,  $F(6,284) = 4.47$  ( $p < .001, \eta^2_p = .09$ ); Cluster x Preparation for Retirement,  $F(6,284) = 51.04$  ( $p < .001, \eta^2_p = .52$ ); Cluster x Sports Practice after Retirement as a Professional,  $F(6,284) = 2.65$  ( $p < .02, \eta^2_p = .05$ ). Tukey's test showed that each cluster was significantly different from all the others: Cluster 1 ( $M = 5.53; SD = 0.06$ ); Cluster 2 ( $M = 5.08; SD = 0.12$ ); Cluster 3 ( $M = 4.52; SD = 0.05$ ), and Cluster 4 ( $M = 7.29; SD = 0.16$ ). These results confirmed the tenability of the four-cluster solution. The four

clusters are shown in Figure 1, and the main results from the ANOVAs for each cluster are shown in Tables 1 and 2.

The first cluster ( $n = 49$ ) was named “*No Fear When Fully Prepared*” for retirement from professional sport. When the handball player had prepared his retirement from professional sport, the ratings were clearly in the middle of the response scale ( $M = 5.53$ ;  $SD = 0.06$ ). All factors showed a significant effect on the participants’ estimated fear of retirement from professional sport (see Table 2). However, the Preparation for Retirement factor had a marked effect among participants in this cluster; they rated the lowest fear of retirement when the professional handball player had fully prepared his retirement ( $M = 2.81$ ;  $SD = 0.66$ ) and the highest when the player had not prepared his retirement at all ( $M = 7.95$ ;  $SD = 0.51$ ). Likewise, the ratings were above the middle of the response scale when the handball player was in the process of preparing his retirement from professional sport ( $M = 5.82$ ;  $SD = 0.43$ ). Tukey’s test showed significant differences between the three modalities of the Preparation for Retirement factor. For the Career Achievements factor, Tukey’s test showed significant differences between the “High Achievement” modality and the “No Achievement” modality ( $p < .001$ ), and between the “High Achievement” modality and the “Intermediate Achievement” modality ( $p < .001$ ). There was no difference between the “Intermediate Achievement” and “No Achievement” modalities ( $p = .254$ ). For the Sports Practice after Retirement as a Professional factor, Tukey’s test revealed a significant difference between the “Individual Sport” modality and the “No Sport” modality ( $p < .016$ ). There was no difference between the “Team Sport” and “Individual Sport” modalities ( $p = .144$ ) or between the “Team Sport” and “No Sport” modalities ( $p = .625$ ).

The second cluster ( $n = 14$ ) was called “*Undetermined*” since all ratings were positioned exactly in the middle of the response scale ( $M = 5.06$ ;  $SD = 0.12$ ). Only the Sports Practice after Retirement as a Professional factor had a significant effect on the participants’

estimated fear of retirement from professional sport. Tukey's test revealed a significant difference between the "Individual Sport" and "Team Sport" modalities ( $p < .009$ ), and between "Team Sport" and "No Sport" modalities ( $p < .015$ ). There was no difference between the "Individual Sport" and "No Sport" modalities ( $p = .973$ ).

The third cluster ( $n = 75$ ) was named "*Less Fear*". All the ratings were in the middle of the response scale ( $M = 4.52$ ;  $SD = 0.05$ ). The ratings were lowest when the professional handball player had fully prepared his/her retirement from professional sport ( $M = 2.08$ ;  $SD = 0.43$ ) and highest when the player had not prepared his retirement at all ( $M = 7.58$ ;  $SD = 0.48$ ). In contrast to Cluster 1, the ratings were low when the handball player was in the process of preparing his retirement from professional sport ( $M = 3.88$ ;  $SD = 0.40$ ). All factors had a significant effect (see Table 2). Tukey's test revealed significant differences between the three modalities of the Career Achievements factor and between the three modalities of the Preparation for Retirement factor ( $p < .001$ ). For the Sports Practice after Retirement as a Professional factor, significant differences were found between the "Individual Sport" modality and the "No Sport" modality ( $p < .005$ ), and between the "Team Sport" modality and the "No Sport" modality ( $p < .001$ ). There was no difference between the "Individual sport" and "Team Sport" modalities ( $p = .807$ ).

The fourth cluster ( $n = 8$ ) was named "*Fear Always Present*". All ratings were higher than the middle of the response scale ( $M = 7.29$ ;  $SD = 0.16$ ). Only the Social Support and the Preparation for Retirement factors had significant effects on the participants' estimated fear of retirement from professional sport. Although ratings were always above the middle of the response scale, they were slightly lower when the professional handball player had prepared his retirement from professional sport ( $M = 6.09$ ,  $SD = 1.54$ ) and highest when the player had not prepared his retirement at all ( $M = 8.48$ ;  $SD = 1.03$ ). Tukey's test showed significant

differences ( $p < .05$ ) between the three modalities of the Preparation for Retirement factor ( $M = 7.29$ ;  $SD = 1.04$  for the “Preparing now” modality).

## **Discussion**

The present study aimed to map professional handball players' positions regarding fear of retirement from professional sport. Results enabled us to determine how players cognitively combined four factors - social support, career achievements, preparation for retirement, and sports practice after retirement as a professional - when judging the level of fear of retirement. Our hypothesis was that there would be at least two different positions on judgments of fear, i.e. positive and negative perspectives of the transition at the end of a sporting career (Carapinheira et al., 2018). Our results confirmed this hypothesis. In fact, three of the four identified positions were related to a positive or a negative perspective of the transition.

We denoted the first position (51.37% of the sample; Cluster 3) as “*Less Fear*”. It was linked to a positive transition. Participants holding this position had the lowest estimated level of fear, except in two circumstances: when retirement had not been prepared at all and when no social support was provided. When judging fear of retirement from professional sport, professional athletes holding this position were less afraid if more social support was available. This finding confirms that the presence of social support (e.g. family and friends) can minimize the level of negative emotions at the end of a sports career (Carapinheira et al., 2018). Furthermore, greater achievement of sporting goals was associated with less fear of retirement; this result confirms the positive effect of sports achievement on emotions felt at the time of retirement from professional sport (Park et al., 2013). Greater preparation for retirement was also associated with less fear. This result is in line with sports scientists' recommendations to sports federations and clubs : better preparation of retirement from professional sport improves the quality of retirement (Stephan, 2005). Planning to continue

practicing sport (individual or team sport) after professional retirement is associated with less fear of retirement, relative to stopping completely. This finding is in line with Torregrosa et al. (2004)'s suggestion which promotes involving athletes in sport in some way at the end of their professional career. Our results confirm that continuing to practice a sport individually or as part of a team is associated with less fear of retirement and perhaps fewer negative emotions.

It appears that combining the availability of social support, continuing amateur sports activity and having accomplished sports goals enables an athlete to move towards a positive life transition when anticipating his/her retirement from professional sport. These factors might promote well-being at the end of the sports career and might protect the athlete from possible difficulties. This might be linked to the "protective frame" concept in reversal theory (Apter, 2006). The protective frame is a type of 'psychological bubble' around an activity that provides the individual with a feeling of protection or safety from a potentially risky situation. Future research could focus on the impact of protective frames on mental health or the quality of transition in retirement from professional sport (Stambulova et al., 2020).

The second position (33.56% of the sample; Cluster 1 "*No Fear When Fully Prepared*") was closer to the negative transition than to the positive transition. The only condition in which the athlete was judged not to be afraid of retirement from professional sport was when he had fully prepared for retirement; individuals in this position developed a positive perspective of the transition. In contrast to the first position, being in the process of preparing for retirement was not enough to reduce the level of fear or the level of negative emotions. The members of the second position appeared to need more reassurance and more certainty than the members of the first position with regard to their life after retirement from professional sport. Full preparation for retirement removed the fear of retirement. This perception relates to another kind of protective frame: the safety zone frame (Apter, 2006). In



this case, a lack of fear is solely associated with complete assurance that an individual's retirement from professional sport is completely dealt with (e.g., a specific professional project at the end of the sports career). Our results suggest the need for professional athletes to perceive a safety zone with regard to retirement from professional sport.

The third position (9.59% of the sample; Cluster 2 "*Undertermined*") was characterised by the absence of a relationship between the sport situation and the level of fear of retirement. There are several possible explanations for this position. Firstly, these participants might not have felt concerned by the issue of retirement from professional sport. They might have been fully immersed in their sporting practice or performance, and end-of-career issues might not have been a priority (D'Angelo et al., 2017). Secondly, they might have felt uncomfortable about judging fear of retirement from professional sport. The end of a sports career might be considered as a tricky issue to judge. This position has been previously found in the study regarding fear of death (Cantisano et al., 2020).

The fourth position (5.48% of the sample, Cluster 4 "*Fear Always Present*") was characterised by a high level of fear of retirement from professional sport. Whatever the situation, participants holding this position made strong judgments of fear of retirement. This position is clearly in line with the negative transition. Although full preparation for retirement and the presence of social support slightly attenuated the level of fear, these athletes still seem to be worried about the end of their sports career.

Some of our results are similar to those reported by Cantisano et al. (2020) regarding fear of death. Firstly, both studies identified four positions. Secondly, social support and the level of accomplishment had a significant effect on fear of judgments for the great majority of our study participants (90.41%, in positions 1, 2, and 4). Thirdly, all of the positions found in the present study regarding fear of retirement from professional sport were quite similar to three of the positions on fear of death. Our first position "*Less Fear*" and our second position

*“No Fear When Fully Prepared”* for retirement from professional sport might correspond to the *“Depends on Circumstances”* position on fear of death. The set of factors had a significant effect on judgments in both studies. Our third position *“Undetermined”* regarding fear of retirement from professional sport is identical to the *“Undetermined”* position for fear of death. Our fourth position *“Fear Always Present”* on fear of retirement from professional sport is similar to the *“Fear Always Present”* position for fear of death. These similarities between fear of death and fear of retirement from professional sport might be explained by the elicitation by some athletes of retirement as a “first death” (Hauw & Lemeur, 2013). In the gerontological and thanatological literature, retirement from professional sport has been linked to a type of death (Navel & de Tychev, 2011). In this context, the retiring athlete moves through stages that are similar to those experienced by a dying individual: shock and denial, anger, bargaining, depression, and (ultimately) acceptance.

### ***Limitations and perspectives***

The present study had some limitations, which should be considered in further research on retirement from professional sport. Firstly, we did not study the quality of retirement from professional sport or assess positive emotions directly (Knights et al., 2019). Secondly, the study did not take account of variables such as injury, financial aspects, the voluntariness of the decision to retire, and the relationship with the team’s coach. These variables are plausibly related to the quality of the end of a sports career (Park et al., 2013). Thirdly, our participants were male handball players. Future studies could include female athletes, former elite players or professional athletes from other sports (e.g. individual sports vs. team sports), and athletes from different countries. Fourthly, and in order to check our suggested explanation for the third (undetermined) position, it would be interesting to measure the level of sports involvement in order to understand its link with fear of retirement from professional sport (Scanlan et al., 2016). Furthermore, following our suggestion whereby

a protective frame might influence the issue of retirement from professional sport, future research could test the effect of various protective frames on fear, risk, stress, and quality of retirement from professional sport (Apter, 2006). Finally, given the study's methodology, the material consisted of 54 vignettes, which can be quite long for participants. Future studies might consider reducing the number of factors or, as for instance, employing a between-subject factorial design while assigning different experimental conditions to participants.

### ***Practical applications***

Our results showed that professional athletes can adopt various positions regarding the fear of retirement from professional sport. This suggests that it is important to consider differences in athletes' perspectives when judging the quality of the end of a sports career. Not all individuals integrate factors in the same manner when judging their fear of retirement from professional sport. We did not identify a "Fearless" group of participants. This result clearly suggests that handball clubs/federations and psychologists could assist athletes and provide various solutions (e.g. career assistance programs) to help them in their retirement from professional sport (Park et al., 2013).

This type of study can help practitioners to develop personalized interventions that protect against negative feelings and emotions upon retirement from professional sport. Our study provides a new tool to help practitioners with this process. The kind of experimental material used in the present investigation could be presented to each athlete. This tool could therefore help practitioners to design appropriate interventions as a function of the individual athlete's position concerning retirement from professional sport. For each athlete, the practitioner might identify the impact of combining various factors on his/her judgments of fear or another emotion. According to the individual results, an appropriate programme could be suggested for the end of the athlete's sports career. This aspect addresses career assistance issues as highlighted by Stambulova et al. (2020).

To sum up, 84,93% of the present study's participants (those in positions 1 and 2) indicated that preparing for retirement from professional sport is crucial for easing the level of apprehension. We believe that the French handball authorities should take this finding into account. Notably, the implementation of pre-retirement planning for all professional players might be an effective measure. For athletes holding position 1, the quality of retirement from professional sport will only be high if all factors are taken into account. Athletes holding position 2 developed the same cognitive process, except that full preparation for retirement is essential for reducing negative emotions. These participants need reassurance about the end of their sports career. Other athletes (those holding position 3) appear to lack information about retirement from professional sport; this might lead to difficulties at the end of their sports career (Park et al., 2013). Lastly, some athletes (those holding position 4) appear to always be afraid of retirement from professional sport. Psychological interventions could identify this cognitive and emotional aspect of preparation for retirement and thus enable the athlete to cope with this fear (Wippert & Wippert, 2008). In this setting, the delivery of information by coaches, clubs, players' unions and former players could help athletes to better cope with negative emotions elicited by retirement from professional sport (Park et al., 2013).

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Table 1

*Mean (SD) fear ratings for each factor, by cluster*

Factor	Cluster 1		Cluster 2		Cluster 3		Cluster 4	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
	5.53	0.06	5.06	0.12	4.52	0.05	7.29	0.16
<b>SOCIAL SUPPORT</b>								
Available	5.08	0.40	5.18	1.18	3.94	0.35	7.11	1.19
Not available	5.97	0.44	4.97	0.65	5.09	0.36	7.47	1.19
<b>SPORTS CAREER ACHIEVEMENT</b>								
High	5.24	0.33	5.11	0.64	4.21	0.25	7.29	1.28
Intermediate	5.61	0.27	5.15	0.72	4.57	0.26	7.25	0.84
None	5.74	0.33	4.97	0.53	4.76	0.28	7.33	0.71
<b>PREPARATION OF RETIREMENT FROM PROFESSIONAL SPORT</b>								
Fully prepared	2.81	0.66	5.29	1.12	2.08	0.43	6.10	2.21
Preparing now	5.82	0.43	5.17	0.67	3.89	0.40	7.29	0.90
Not prepared	7.96	0.51	4.77	1.03	7.58	0.48	8.49	1.05
<b>SPORTS PRACTICE AFTER RETIREMENT FROM PROFESSIONAL SPORT</b>								
Team sport	5.55	0.28	4.97	0.62	4.46	0.26	7.35	1.10
Individual sport	5.42	0.29	5.26	0.53	4.42	0.26	7.19	0.89
No sport	5.62	0.35	4.99	0.54	4.66	0.27	7.33	0.90



Table 2

*Main results of the ANOVAs for each cluster.*

Cluster and factor	Effect		Error		F	p	$\eta^2_p$
	df	MS	df	MS			
<b><i>Cluster 1: No fear when fully prepared</i></b>							
Social support (S)	1	531.59	48	8.09	65.73	<.001	.58
Sports career achievements	2	58.74	96	2.61	22.53	<.001	.32
Preparation for retirement (P)	2	5898.31	96	17.05	345.91	<.001	.89
Sports practice after retirement	2	9.55	96	2.30	4.15	.019	.08
S x P	2	1.66	96	1.76	0.39	.395	.02
<b><i>Cluster 2: Undetermined</i></b>							
Social support (S)	1	7.84	13	14.01	0.56	.468	.04
Sports career achievements	2	2.25	26	2.71	0.83	.447	.06
Preparation for retirement (P)	2	18.48	26	13.61	1.36	.275	.09
Sports practice after retirement	2	6.60	26	1.01	6.52	.005	.33
S x P	2	0.45	26	0.91	0.50	.613	.04
<b><i>Cluster 3: Less fear</i></b>							
Social support (S)	1	1347.38	74	8.37	160.98	<.001	.69
Sports career achievements	2	104.26	148	2.49	41.82	<.001	.36
Preparation for retirement (P)	2	10584.23	148	16.64	636.25	<.001	.90
Sports practice after retirement	2	22.08	148	2.67	8.28	<.001	.10
S x P	2	5.11	148	1.90	2.69	.071	.03
<b><i>Cluster 4: Fear always present</i></b>							
Social support (S)	1	14.08	7	1.91	7.36	.030	.51
Sports career achievements	2	0.25	14	0.94	0.26	.770	.04
Preparation for retirement (P)	2	205.44	14	16.65	12.34	<.001	.64
Sports practice after retirement	2	1.03	14	0.73	1.41	.277	.17
S x P	2	0.36	14	1.07	0.34	.720	.05

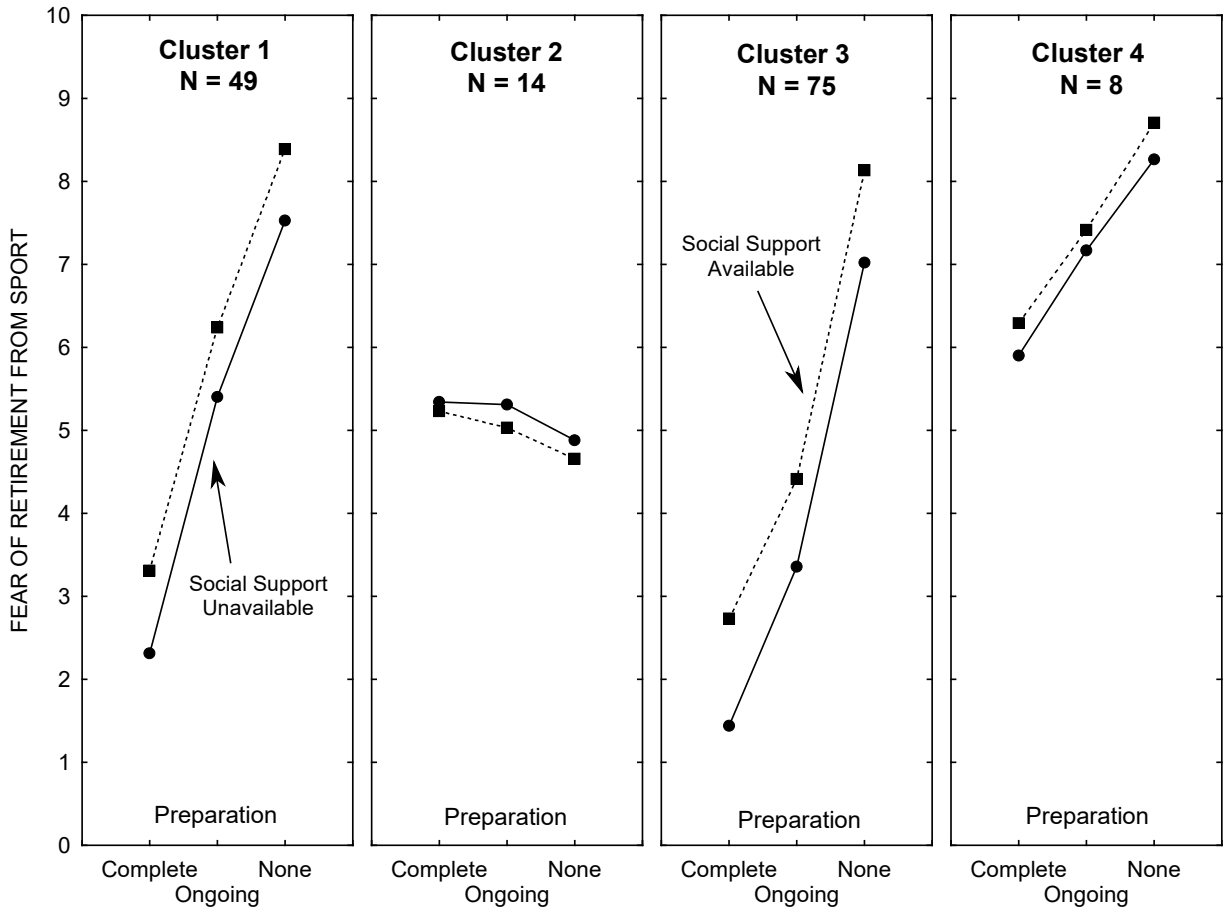


Figure 1. Effects of preparation for retirement from professional sport and the availability of social support on fear of retirement.

Note: The figure shows participants' judgment of fear of retirement from professional sport in four clusters. Each panel corresponds to a cluster (Clusters 1, 2, 3 and 4, respectively, from left to right). The mean fear ratings are displayed on the y-axis, and the three levels of preparation for retirement are shown on the x-axis. Dotted lines correspond to the availability of social support, and solid lines correspond to the unavailability of social support.