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Analysis of the perception of self-efficacy in paragliding pilots

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Abstract

This work analyses the perception of self-efficacy (PA) in paragliding pilots, as one of the most relevant variables involved in the risk assumption that comes with practising this sport. The sample consists of 197 pilots (age: *M* 41.76 years ± 9.9), 19 women and 178 men. A paragliding-specific self-efficacy scale was developed, following Bandura's indications (2006), and the effects of variables such as the pilot's sex, experience level, competition level and injuries sustained were analysed. The results show that paragliding pilots have a high PA (more so men than women), especially in relation to their decision-making capabilities. PA increases with experience and is greatest in pilots at high levels of competition. PA is not associated with pilot accidents or injuries.

Keywords: Self-efficacy, air sports, paragliding, extreme sports, experience, sex, injuries

The practice of extreme sports is associated with the *Sensation Seeking* personality trait (Zukerman, 1979), one of the most relevant explanatory variables of risky behaviours (Bołdak and Guszkowska, 2016; Breivik, 1996; García-Naveira, Locatelli, Ruiz-Barquín and González, 2016; Glicksohn. and Naor-Ziv, 2016; Gomá i Freixanet, Martha and Muro, 2012; Llewellyn and Sánchez, 2008). However, this theory cannot explain the role played by other motivations, commonly mentioned by practitioners of extreme sports, such as the desire for achievement and mastery (Slanger and Rudestam, 1997). Also, it does not explain how variables such as recognising the existence of real risk and the fear derived from it are handled in risky situations; variables which results in many people not practicing these sports.

One aspect that we consider relevant is the confidence athletes have in their own powers to confront such risks, in a way that allows them to control the fear that would usually result. Studies conducted with athletes reveal a negative relationship between the amount of anxiety and fear involved in an endeavour and the PA level (Bandura, 1986). Gómez, Hill y Ackerman (2007) observed with climbers that overcoming fear influences a person's ability to work harder the next time; this, in turn, increases self-confidence and, consequently, the practice frequency. Merritt and Tharp (2013) observed the significant mediating role of PA in the relationship between the stable traits of neuroticism and meticulousness, responsibility, and risk-taking in *parkour* runners (free runners).

Possibly, self-efficacy allows a person to overcome their fears and rely on their abilities to successfully address and resolve the risky situation; in fact, Slanger and Rudestam (1994), in a work carried out on different extreme sports (climbing, aerobatic flying, kayaking and skiing), observed a higher PA in athletes who assumed extreme risks compared to those who assumed high risks; they deduced that the element most responsible for the disinhibition associated with the practice of risky behaviour would be PA.

Bandura's PA theory (1977) considers that beliefs of self-efficacy refer to the judgments each individual makes about his or her abilities to perform a specific task. These beliefs are a decisive factor in achieving success in the tasks and goals proposed; they are directly related to the motivation and involvement of the subject in a given activity.

Although there are many works that analyse PA in sport (Feltz, Short and Sullivan, 2008; Moritz, Feltz, Fahrbach and Mack, 2000; Ortega, 2005), it has rarely been linked to extreme sports. According to Bandura (1997, 2006), previous domain experience is one of the sources of self-efficacy information, along with vicarious experience, verbal persuasion, and physiological and affective states. Accordingly, years of experience practising risky sports, as well as achievements in competitions, could influence an increase in the practitioner's PA.

On the other hand, Bandura determined that the greater the control over the level of challenge, the greater the increase of self-efficacy in success, resulting in fewer injuries, something very common in extreme sports. Rubio, Pujals, de la Vega, Aguado and Hernández (2014) conducted a study on the relationship between self-efficacy and injuries in various sports. They concluded that PA did not directly affect the number of injuries, rather that coping strategies mediated this relationship. In their work, they did not analyse any extreme sports so it would be interesting to know if, in this type of activity, it would play a more relevant role.

Paragliding can be considered an extreme sport given the high number of accidents experienced by its practitio-

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ners. This means that few people do it, and those who do are mainly men, as is the case in other sports of this type (Çelik, 2016; Martha and Laurendeau, 2010; Murat, 2014).

Despite being one of the most practised air sports in Spain due to its accessibility and low cost (Luque, 2003), there has been very little research focused on the psychological characteristics of the pilots. Bearing in mind that Bandura (1997, 2006) considers that efficacy beliefs are specific to particular and differential domains (they do not form a general construct), and he therefore recommends that situation-specific measures be used to measure self-efficacy, we intend to study PA in paragliding pilots in this work, developing a specific scale for the domain, and delving into how it is affected by variables such as the degree of experience (years of practice and flight hours performed annually), the competition level, and the pilot's gender, as well as analysing their possible relationship with the injuries suffered by these athletes.

Method

Participants

A total of 197 free-flight paragliding pilots, 19 women and 178 men, aged between 19 and 69 (M 41.76 ± 9.9), voluntarily participated in this study. Most are Spanish nationals (86.3%), the rest coming from other countries, mainly from Latin America. Of the sample, 146 are federation members (75%), representing 10% of the pilots federated in Spain in 2015 (1,492 licenses). We can therefore say that the sample is representative with a 95% confidence level.

Instruments

Data were obtained from the pilots related to the practice that we considered relevant: age; sex; pilot experience (<one year, one-five years, five-10, 10-20, >20 years); annual flight hours (<50, 50-100, 100-200, >200 h.); the competition level at which they participate (does not compete, regional, national, international); and if they have had any accidents and/or injuries practising the sport.

Subsequently, we developed a paragliding PA scale for this study following the guidelines published in the *Guide for Constructing Self-Efficacy Scales* chapter (Bandura, 2006); in the literature, we did not find a valid measure that was specific to self-efficacy in paragliding.

First, the relevant PA variables were identified in the domain being considered. To do this, we followed the indications of Valín, Higueras and Meléndez (2004), turning to paragliding experts and academics specialized in sports psychology and the Bandura theory. A total of 15 questions were developed that are rated from 0 to 10 on a perception capacity scale, with 0 being *not capable at all* and 10 being *fully capable* of dealing with a specific situation with guaranteed success. Intermediate values indicate whether one is relatively capable of dealing with such a situation. The statements were drafted following the principles dictated by Bandura in his self-efficacy scales construction guide (Bandura, 2006).

Two aspects were considered: A) The specificity of the activity domain - factors determining capabilities within paragliding free flight (physical, technical, theoretical and psychological); and B) Challenge levels facing the pilot - referring to the levels of demand presented by each task. To this end, the statements were prepared and categorized into the following groups, following the instructions of Valín et al. (2004): *Concentration* (I can maintain concentration for a particular task during the flight); Attention (I can keep attentive to different stimuli during the flight); *Activation level* (I can perceive hints about changing weather conditions during the flight); *Decision-making* (I can make accurate decisions during the flight, based on my experience as a pilot; I can make the right decisions during the flight, thanks to my technical knowledge of paragliding); *Useful experience* (I am able to anticipate my decisions to avoid putting myself in dangerous situations); *Technique on the ground* (I can control the sail or paraglider by keeping it stable on the ground, even in strong wind without losing control); *Flight Technique* (I can anticipate the reactions of my sail or paraglider to any turbulence; I am able to avoid folding by anticipating the reactions of my sail or paraglider; I feel able to deal with any flight situation even in adverse weather situations), *Physical condition* (I can fly for more than three hours without tiring; I can fly for more than five hours without tiring; I can maintain concentration during the flight despite fatigue); *Self-confidence* (I am aware of my abilities as a paragliding pilot; I am aware of my limitations as a paragliding pilot). *Cronbach's Alpha* was .915, highlighting the high internal consistency and reliability of the constructed scale.

Subsequently, through the *Google* Forms online tool, the questionnaire was disseminated using various national social media paragliding groups, mainly on *Facebook* or *WhatsApp.*

Data analysis

A descriptive analysis was carried out of the pilots' characteristics and the PA questionnaire. In addition, the PA of men/women and of the injured/uninjured were compared using Student's t test. An ANOVA analysis was performed to determine the possible effects of the years of experience, flight hours per year and competition level variables, and their possible interactions in the PA of the pilots, eliminating effects from secondary sources of variation (age and gender). The SPSS 22.0 statistical programme was used. The results were examined with a significance level of $p < .05$.

Results

Pilot characteristics

As far as age is concerned, we can see that paragliding is a sport practised by a wide range of the population (19-69 years) although only 11.2% of the pilots who participated are under 30 years old and 14.7% over 50. As a result,

almost three-quarters of practitioners are in the 30-50-year age range. Both sexes have a very similar average age (women, 40.16 ± 8.84; men, 41.93 ± 9.99).

Regarding paragliding experience, one can observe that almost half of the pilots have been practising this sport for more than 10 years and almost a quarter for more than 20. On the other hand, the majority (43.1%) fly between 50 and 100 hours a year. 45.7% of the participants compete in some form of paragliding, of which 31.1% compete at the regional level, 52.2% at the national level and 16.7% internationally (Table 2) 50.25% of pilots have suffered accidents and/or injuries. These proportions are maintained in both sexes, with 10 out of the 19 women having been injured whereas, in the case of men, it was 89 out of 178 (Table 2).

Escala de autoeficacia

El análisis descriptivo nos muestra (Tabla 1) una PA alta por parte de los pilotos (*Puntuación total de autoeficacia*: 7.92. Las puntuaciones son superiores a 8 puntos en las siguientes categorías: *Concentración, Atención, Nivel de activación, Toma de decisiones, Experiencia útil, Técnica en el suelo* y *Autoconfianza*. Sin embargo, en las categorías referentes a *Técnica en vuelo* y C*ondición física*, presentan puntuaciones inferiores a 8. En la primera destaca el ítem 13 (Me siento capaz de afrontar cualquier situación de vuelo incluso en situaciones meteorológicas adversas), con una puntuación media de 6.54 ± 2.7. En la segunda, el ítem 11 (Puedo estar más de cinco horas volando sin fatigarme), tiene una puntuación media de 5.25 ± 3.2.

Tabla 1

Average scores and typical deviations (men, women and totals) of the Paragliding Self-Efficacy Scale. t-scores (male-female comparison)

SELF-EFFICACY PERCEPTION SCALE		Total		Men		Womens		
		M	*DT*	*M*	*DT*	*M*	*DT*	*t*
CONCENTRATION	1 I can stay focused on a specific task during the flight	9.07	1.19	9.07	1.2	9	1.11	.254
ATTENTION	2. I can keep attentive to different stimuli during the flight	8.71	1.31	8.76	1.32	8.26	1.10	1.572
ACTIVATION LEVEL	3. I can perceive hints of changing weather conditions during the flight	8.09	1.70	8.15	1.63	7.47	2.22	1.658
DECISION-MAKING	4. I can make the right decisions during the flight. based on my experience as a paragliding pilot	8.34	1.50	8.35	1.46	8.16	1.86	.540
	5. I can make the right decisions during the flight. based on my technical knowledge of paragliding	8.07	1.66	8.11	1.61	7.68	2	1.072
USEFUL EXPERIENCE	6. I am able to anticipate my decisions to avoid putting myself in dangerous situations	8.55	1.47	8.62	1.41	7.89	1.91	2.05*
TECHNIQUE ON THE GROUND	7. I can control the sail by keeping it stable on the ground. even in strong wind without losing control	8.30	1.67	8.40	1.61	7.42	1.95	2.46*
FLIGHT ECHNIQUE	8. I can anticipate the reactions of my sail to any turbulence	7.59	1.91	7.70	1.82	6.58	2.46	2.46*
	9. I am able to avoid folding by anticipating the reactions of my sail	7.71	1.95	7.76	1.89	7.21	2.47	1.16
	10. I feel able to deal with any flight situation even in adverse weather situations	6.54	2.70	6.74	2.61	4.68	2.85	3.23**
PHYSICAL CONDITION	11. I can be flying for more than three hours without fatigue	7.45	2.63	7.63	2.48	5.74	3.38	3.05**
	12. I can be flying for more than five hours without fatigue	5.25	3.16	5.44	3.11	3.53	3.17	2.54*
	13. I can stay focused during the flight despite the fatigue	7.09	2.17	7.22	2.10	5.84	2.69	2.68**
SELF-CONFIDENCE	14. I am aware of my abilities as a paragliding pilot	8.95	1.22	8.95	1.24	9	1.11	-.171
	15. I am aware of my limitations as a paragliding pilot	9.08	1.17	9.09	1.16	9	1.33	.317
TOTAL SELF-EFFICACY PERCEPTION SCORE		7.92	1.29	8	1.25	7.16	1.52	2.71**

**P < .05; **P < .01*

Below, we will detail the inferential results found by the covariance analyses with each relevant variable:

Sex and PA

In the analysis, we observe that women always have lower scores than men. These differences are significant in the *Total score* (*t:*2.71, *p* <.01), as well as in items relating to *Useful experience, Technique on the ground, Flight technique* and *Physical condition*. We find no differences in items relating to *Concentration, Attention, Activation Level, Decision-making* and *Self-confidence* (Table 1).

Level of experience, level of competition and PA

Regarding the level of experience, we find a significant effect on the *Total score* both from the years of practice (*F:* 19.444, *p* <.01) and from flight hours (*F:* 18.020, *p* <.01). The same is true for most items except item 15 (I am aware of my limitations as a paragliding pilot), where no such effect occurs

in either variable. Bonferroni's test shows that, mainly, it is groups one and two, respectively (<1 year of experience and 1-5 years of experience, on the one hand, and <50h annually, and 50-100 hours annually on the other, which mainly cause these differences (p<.01) in the case of the worse scores. The ANOVA results show that the effects of both factors remain significant in controlling age and gender variability (Experience level, F: 18,943, p < .01, η^2_p.284, *1-β*: 1; Hours of flying, F: 18.152, p < .01, η^2_p .221, *1-β*: 1). However, the interaction of these variables does not have a significant effect, as might be expected.

Tabla 2

Average scores and typical deviations in total PA of the groups for the variables Years of experience, Competition level, Flight hours and Injuries

		M	*DT.*	*N*
Years of experience	<1	5.27	2.00	8
	1-5	7.37	1.05	40
	5-10	7.81	1.14	52
	10-20	8.32	1.01	50
	>20	8.53	1.01	47
Flight hours per year	<50	7.08	1.42	46
	50-100	7.79	1.13	85
	100-200	8.58	.97	47
	>200	8.88	.88	19
Competition level	Doesn't compete	7.48	1.36	107
	Regional	7.99	1.01	28
	National	8.59	.98	47
	International	8.80	.69	15
Injury	No	7,89.	1.38	98
	Yes	7.95	1.21	99

In relation to the Competition Level, we also find a significant effect on the *Total Score* (F: 12.390, p <.01), and in almost all categories, except in *Concentration, Attention* and *Self-Confidence*. Bonferroni's test points to the non-competition group as the main cause of these differences (p<.01), having worse scores than the national and international groups.

When controlling the sources of age and gender variation, we do not see any changes in the effects of this variable on PA (F: 12.390, p <.01, η^2_p: .158, *1-β*: 1). The interaction of the competition level with the years of experience is significant (F: 2.139, p < .05, η^2_p: .107, *1-β*: .897).

Injuries sustained and PA

No difference has been found between had an accident/injured and not had an accident /injured in either the *Total Score* of self-efficacy or in each of the criteria.

Discussion

Our goal in this work was to analyse PA in paragliding pilots as a domain-specific belief, following Bandura (1997, 2006). For this, we constructed the PA Scale in Paragliding considering both physical capabilities and decision-making. Works that has analysed self-efficacy in extreme sports have used general scales rather than specific domain scales. We only found one specific measure in climbing (Llewellyn, Sanchez, Asghar and Jones, 2008).

This scale has allowed us to conclude that paragliding pilots have a high specific PA for performing successfully, mainly in terms of their cognitive and decision-making capabilities, for which they have greater self-efficacy than in their in-flight technical skills or fitness. These data corroborate the results obtained on the importance of PA in extreme sports in research such as that by Slanger and Rudestam on paragliding (1996), Gómez et al. (2007) and Llewellyn et al. (2008) on climbing.

This lesser confidence in their physical condition might be due to the pilots lacking an optimal state for comfortably enduring long-duration flights. While it is true that physical condition is not a limiting factor in this sport, it must not disregarded - in order for a pilot to be able to face long-duration flights (more than five hours), minimal physical qualities are essential to delay the onset of fatigue and to maintain concentration and attention in flight for longer.

We also set out to analyse certain variables that, we believe, can affect the PA of pilots - sex being one of them. First, we should point out the great difference in male and female practitioners, following the same pattern as in other studies, both for paragliding (Murat, 2004) and other sports that carry a significant risk: rock climbing (Llewellyn and Sanchez, 2008), alpine skiing, skydiving and mountaineering (Castanier, Le Scanff and Woodman, 2010), and skydiving itself (Bołdak and Guszkowska, 2016); all showing that men are more interested in this type of sport (Murat, 2004).

One of the possible causes for this difference might be that women perceive such activity as higher risk than men do (Demirhan, 2005); also in the work by Kontos (2004) on adolescent risk perception and risk-taking, it was found that boys had significantly higher scores on the risky behaviours scale (*Risk Taking Behaviours Scale*) and lower scores on the perceived risk of injury scale in sport (*Risk of Injury in Sport*).

Second, women have a lower PA than men, especially in the technical aspects of flight and in their physical condition, which could also be the cause for them practising it less. In various works, the woman always score less than the man in motor self-efficacy, as in the study by Hernández-Alvarez, Velázquez-Buendía, Martínez-Gorroño, Garoz and Tejero (2011), who designed and validated the motor self-efficacy scale for 13 to 17 year old Spanish adolescents, and observed these differences at all ages. Similar results include Spence, Blanchard, Clark, Plotnikoff, Storey

and McCargar (2010), who concluded that differences in physical activity practice between boys and girls are mainly due to higher PA in boys.

We consider pilot experience to be another relevant variable and, indeed, we can conclude that PA increases with it, regardless of age; paragliding being a sport in which the passing years strengthens its practice. This idea forms the basis of Bandura's theory (1997), which highlights the specific achievements from the subjects' own past experience.as a source of self-efficacy information. In our case, the years of practice are as important as the amount of practice (flight hours) performed per year. It might even be the case that those who feel more capable and rely more on their skills are more motivated and spend more time flying. Similar results were found by Slanger and Rudestam (1997) in interviews with various extreme athletes, noting that the way to develop PA is the experience of successful performance itself. Age, however, does not seem to be relevant to the PA of the pilots in our study.

We also observed a higher PA related to competition. Other authors, such as Salguero, González-Boto, Tuero and Márquez (2003), studying competitive swimmers, found that those competing at a lower level presented greater perceived specific physical ability than those at the national level. Possibly the differences between these sports, swimming and paragliding, with very different cognitive and risk requirements, are the reason for these results. However, within Bandura's theory, we consider is very reasonable that the people competing feel more competent in this sport, given that competing poses an added challenge to the risk of flying, and PA is strongly related to tackling new challenges (Feltz et al., 2008).

Finally, we set out to analyse whether high self-efficacy influences the accidents that pilots might have by taking more risks relying on their capabilities. In this sense, we see that there is a very high percentage of injuries, demonstrating the risk that this sport entails; nonetheless those who have a higher PA are not injured more, nor are more men than women injured, as presented in other paragliding studies (Steed, 2009). So, we can conclude that the number of accidents or injuries does not vary with PA, as we might initially suspect. We find very contradictory results when considering certain works; in some, those athletes with more self-efficacy are injured more, while other works demonstrate the opposite (Rubio et al., 2014). It is possible that there are mediating variables between injury and self-efficacy, so self-efficacy cannot be said to have any relationship to sports accidents or injuries (Rubio et al., 2014).

In conclusion, in our work, we attempt to provide a domain-specific PA measurement questionnaire which allows us to analyse the importance of this variable in extreme sports such as paragliding. The pilots in our study manifest high specific PA, especially in their cognitive abilities, which increases with experience and the volume of practice. Women practice this sport far less than men, and also have a lower PA for their physical condition and flight technique. It would be interesting to continue researching the possible relationships between PA and other participant characteristics, such as sensation seeking, in order to be able to learn more about the psychological variables that underlie the extreme athlete.

Análisis de la percepción de autoeficacia en pilotos de parapente

Resumen

Este trabajo analiza la percepción de autoeficacia (PA) en pilotos de parapente, como una de las variables más relevantes implicadas en la asunción del riesgo que conlleva la práctica de este deporte. La muestra la componen 197 pilotos (edad: M 41.76 años ± 9.9), 19 mujeres y 178 hombres. Se elaboró una escala de autoeficacia específica del dominio del parapente, siguiendo las indicaciones de Bandura (2006), y se analizaron los efectos de variables como el sexo del piloto, el nivel de experiencia, el nivel de competición y las lesiones sufridas. Los resultados nos muestran que los pilotos de parapente tienen una PA elevada (más los hombres que las mujeres), sobre todo en relación con sus capacidades de toma de decisión. La PA aumenta con la experiencia y es mayor en los pilotos de niveles altos de competición. La PA no se asocia a los accidentes o lesiones de los pilotos.

Palabras Clave: Autoeficacia, deportes aéreos, parapente, deporte de riesgo, experiencia, sexo, lesiones.

Análise da percepção de autoeficácia em pilotos de parapente

Resumo

Este estudo analisa a percepção de autoeficácia (PA) em pilotos de parapente, como uma das variáveis mais relevantes envolvidas na tomada de risco implicada na prática deste esporte. A amostra é composta por 197 pilotos (idade: M 41,76 anos ± 9,9), 19 mulheres e 178 homens. Uma escala de autoeficácia específica para o domínio de parapente foi desenvolvida, seguindo as indicações de Bandura (2006), e os efeitos de variáveis como o sexo do piloto, o nível de experiência, o nível de competição e as lesões sofridas foram analisados. Os resultados mostram que os pilotos de parapente têm PA elevada (mais homens que mulheres), especialmente em relação às suas habilidades de decisão. PA aumenta com a experiência e é maior em pilotos de alto nível de competição. A PA não está associada a acidentes ou lesões de pilotos.

Palavras chave: Autoeficácia, esportes aéreos, parapente, esportes de risco, experiência, sexo, lesões.

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