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Protective Gloves in Historical European Martial Arts:

A Brief Review of Current Practice

Author(s): Sean Wauters

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Communication: Mars@kinebijvechtsporten.be

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Abstract

Introduction: Historical European Martial Arts (HEMA) is a diverse martial discipline that combines historical fidelity with modern training and competition formats. A core element in ensuring safety during practice and competition is the use of protective gloves.

Aim: This paper investigates the different categories of HEMA gloves—light, medium, and heavy-duty—and evaluates their suitability across varying intensities and contexts of use. Using the injury prevention model by Van Tiggelen et al. (2008), with a focus on the final three phases—implementation, evaluation, and refinement—this study examines the trade-off between protection and dexterity, and explores the phenomenon of risk compensation.

Results: This analysis reveals a clear inverse relationship between mobility and protection of different types of protective gloves. While heavy-duty gloves offer the highest protection, they restrict technical execution, whereas lighter gloves enhance dexterity but provide limited safety

Conclusion: The type of glove used in HEMA should be matched to the intensity and nature of the activity. Light gloves offer high dexterity and are best suited for technical drills and controlled, low-intensity settings. Medium gloves provide a balance between mobility and protection but require careful use to avoid risk compensation. Heavy-duty gloves deliver the highest level of protection and are essential for high-intensity, competitive tournaments, though they limit fine control. High-performance gloves aim to bridge the gap but currently lack durability. With proper conditions and skilled participants, lighter gloves may be used in select tournament formats, though with an increased risk profile.

Keywords: Historical European Martial Arts – Historical Fencing – Injury Prevention – Protective Gloves – Dexterity.

INTRODUCTION

Historical European Martial Arts (HEMA) refers to a collection of martial disciplines historically originating in Europe. Disciplines can vary between martial systems from the Middle Ages, early modern period (renaissance) and Napoleonic and Victorian Eras. Some would even include ancient history and recent modern history. It includes a broad spectrum of armed and unarmed combat styles—both armored and unarmored—comparable in complexity and diversity to Eastern martial arts such as judo, jiu-jitsu, or kendo. Practitioners engage with a variety of historical weapons, such as the longsword, rapier, sabre, and polearms like the spear and poleaxe (Green, 2001; Jaquet, 2015; Wauters & Van tiggelen, 2016; Wauters 2023 a, Wauters 2023b, Wauters 2023c).

HEMA training encompasses a range of contact levels, from low-intensity technical drills to full-contact competitive bouts. The level of protective equipment required varies by style: some require minimal gear such as a fencing mask, throat guard, and soft glove,

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while full-contact formats necessitate comprehensive gear covering the head, torso, arms, and legs (Wauters, 2016; Wauters, 2023 a, Wauters 2023b, Wauters 2023c).

Unlike modern Olympic fencing, HEMA emphasizes historical accuracy, realistic striking force, and often includes grappling and wrestling. This dynamic range leads to a unique injury profile highlighting the need for a structured approach to injury prevention and safety research. Just like its Eastern counterparts, HEMA deserves full recognition within the global martial arts community (Green, 2001;Jaquet, 2015; Jacquet & Walczak 2015; Jaquet et al. 2015; Wauters & Vantiggelen, 2016; Wauters 2023a, Wauters 2023b, Wauters 2023c).

HEMA, like many martial arts, can be practiced both recreationally and competitively, across different intensities and training modalities. Sessions may include physical conditioning, technical drills of varying intensity, and tactical preparation. Some HEMA schools also train solo routines or “forms” analogous to *kata* in Eastern martial arts. Depending on the nature, intensity, and objective of the training or competition, the likelihood and severity of injury risk may increase. Some HEMA schools even include technical exercises with sharp steel swords, albeit at very low intensity to reduce the injury risk (Green, 2001; Wauters, 2016; Wauters, 2023a, Wauters 2023b, Wauters 2023c).

Various competitive formats exist within the discipline. The most common are full-contact tournaments Less common formats include cutting contests—akin to *tameshigiri* in Kenjutsu (Kremer et al. 2008; Takeuchi, 2008; Habersetzer, 2023)—and form competitions, similar to *kata* tournaments in Eastern systems. Additionally, technical Blöß tournaments and competitions focus on precision and skill, often allowing less protective gear due to the controlled nature of engagement. It has even been suggested that certain highly technical, low-intensity form competitions could potentially be conducted with sharp swords, given the predictability and deliberate pacing of movements.

Prevention and risk compensation.

Prevention in the context of sports injuries is more than just avoiding injury. It is a thoughtful process focused on identifying risks, understanding their causes, and implementing targeted measures to reduce the likelihood of injury. Modern prevention strategies rely on frameworks to make consistent and efficient preventive measures (Pless, 2016; Hagel & Meeuwissen, 2004; Finch, 2006; Van Tiggelen et al., 2008; Wilde, 1994, Wilde 2006). Within these frameworks, we distinguish between primary, secondary, and tertiary prevention. Primary prevention involves preventing an injury from occurring in the first place. Secondary prevention refers to treating and healing an injury — in the sports medicine world, this often means rehabilitation or physiotherapy. Tertiary prevention aims to prevent injuries from becoming chronic. Injuries can have far-reaching consequences: not only for the athlete, but also for teams, sports organizations, and the healthcare system. Prevention is therefore essential. However, effective prevention requires more than just good intentions; it demands a structured approach based on scientific evidence and practical applicability. One of these models is the model of Van tiggelen et al (2008) which is basted on the Model of Van Mechelen

(1994). Other models such as that of Finch (2006) follow the same principle.

1. **Identify the injury problem**
   → Determine which injuries occur, how often they happen, and how severe they are.
2. **Understand the aethiology and injury mechanisms**
   → Analyze why these injuries occur, including biomechanical, environmental, and other risk factors.
3. **Develop targeted interventions**
   → Design specific preventive measures based on the identified risks (e.g.,protective equipment, technique adjustments, training modifications).
4. **Test interventions efficacy**
   → Evaluate the effectiveness of the interventions in controlled environments
5. **Test the efficiency and complience**
   → Apply the validated preventive measures in actual training or competition settings.
6. **Evaluate risk taking behavior.**
   → Are behaviours altered by the preventive measure and do they need to be revaluate.
7. **Evaluate the effectiveness by repeating step 1.**

A successful injury prevention strategy must not only be scientifically sound but also feasible and acceptable to the practitioner community. Effectiveness depends on both accurate execution and sustainable implementation.

Risk compensation refers to behavioral changes individuals make when they perceive themselves to be safer due to protective measures. In sports medicine, this might mean that athletes engage in riskier behaviors—such as more aggressive play—when equipped with protective equipment such as helmets, gloves, under the false impression of being impervious to injury. This behavioral shift suggests that risk is perceived as a balance. When athletes feel more secure due to external protection, they may subconsciously compensate by taking more physical or tactical risks. Research indicates that risk compensation is not uniform; it depends on individual traits, sport type, and the specific protective gear involved. Understanding and mitigating this phenomenon is critical for ensuring the actual effectiveness of injury prevention strategies (Pless, 2016; Hagel & Meeuwissen, 2004; Finch, 2006; Van Tiggelen et al., 2008; Wilde, 1994, Wilde 2006;).

Among all pieces of protective equipment in HEMA, gloves play a particularly crucial role. Generally, three core categories of gloves exist—light, medium, and heavy-duty—each offering varying degrees of mobility and protection. A fourth category has recently emerged: the high-performance glove. These latter are designed to combine the mobility of light gloves with the protection of heavy duty models, these gloves show promise but are reportedly less durable and more prone to damage. .

Aim

The aim of this paper is to explore the three main categories of HEMA gloves—light, medium, and heavy-duty—and to assess their suitability across different training intensities and competitive settings. This discussion primarily addresses steps 4 through 6 of the Van Tiggelen model (2008), focusing on implementation, evaluation, and feedback in real-world practice.

RESULTS

The results of this analysis are outlined in table 1-5. They are ordered by type of glove, setting of use, degree of protection and degree of dexterity.

Types of Gloves in HEMA

Light Gloves

Light gloves feature minimal padding and no internal hard reinforcements. Typically made of leather, synthetic leather, or kevlar, they provide

some protection against light strikes but are not designed for high-impact engagements. (photo 1 & Table 1).

Medium Gloves

These gloves offer more protection compared to light gloves, often incorporating internal plastic or (in some cases) metal reinforcements. They serve as an intermediate option, balancing protection and dexterity (photo 2 & Table 2).

Heavy-Duty Gloves

Designed to absorb the full force of high-impact strikes, heavy-duty gloves include extensive protective features such as hard shells made of plastic or metal. Examples include SPES Lobster gloves and SparringGlove products. Despite their effectiveness, injuries have still occurred while using them (Wauters, unpublished data). These gloves are the current standard for high-intensity, high-risk competitions, although they are not infallible (photo 3 &) table 3.



Photo 1 : Light gloves. Red dragon light gloves or related.

Score: Dexterity:	
Fingerdexterity (0-3)	2.5
Thumb dexterity (0-3)	2.5
Wrist dexterity (0-3)	2.5
General (0-1)	1
Total	8.5/10
Score protection:	
Fingers (0-3)	1
Thumb (0-3)	1
Wrist (0-3)	1
Back	1
General	
Total:	4/10

Table1: Dexterity and protection score light glove



Photo 2: Medium gloves. Red dragon medium gloves or related.

Score: Dexterity:	
Fingerdexterity (0-3)	2
Thumb dexterity	2
Wrist dexterity	2
General (0-1)	1
Total	7/10
Score protection:	
Fingers	1.5
Thumb	1.5
Wrist	1.5
back	1.5
General	
Total:	6

Table2: Dexterity and protection score medium glove



Foto 3: Heavy duty gloves: Spess Lobster glove or related.

Score: Dexterity:	
Fingerdexterity (0-3)	1
Thumb dexterity	1,5
Wrist dexterity	1,5
General (0-1)	0
Total	4/10
Score protection: 0-10	
Fingers	2
Thumb	2
Wrist	2
back	2
General	0.5
Total:	8.5/10

Table 3: : Dexterity and protection score medium glove

High-Performance Gloves

These gloves aim to combine high protection with high dexterity. Examples include the Red Dragon Dreadnought and the ProGauntlet by Crossguard. However, current models suffer from durability issues and are not yet considered reliable for sustained competitive use. As such, they will not be further analysed in this paper.

Degree of Protection

Light gloves are soft, padded gloves without internal or external reinforcements. Generally—but not always—these gloves are made of natural or, synthetic leather, or Kevlar and contain internal padding to soften the force of impact. They are often designed with five fingers, although mitten-style variants do exist. The latter are far less common in use. Due to their soft materials, light gloves are capable of absorbing minor impacts and thrusts but are often inadequate for more intense impacts, which can still lead to injuries.

Medium gloves feature not only general padding but also internal hard material reinforcements. These are usually made of hard plastic, although in some cases metal is used. In many aspects, they serve as a middle ground between light gloves and heavy-duty gloves. These gloves are comparable, but not similar to lacrosse gloves.

Heavy (duty) gloves are designed with the primary goal of protecting the hands as effectively as possible from the heavy impacts of swords and other weapons used in HEMA. Several manufacturers, including SPES Lobster Gloves and SparringGlove.com, go to great lengths to develop robust and durable protective gear. The hard outer shell and sturdy design make these gloves particularly well-suited for this purpose. Although this type of glove currently offers the best available protection, accidents have still occurred in the past (Wauters & Vantiggelen 2016; Wauters, unpublished data). While these gloves are now widely accepted as the standard in most high-level tournaments, they are not infallible. These gloves are comparable but not similar to Kendo gloves.

Degree of Dexterity vs Degree of Protection

Dexterity refers to the skill and agility with which a person can use their hands, body, or mind to perform tasks. It often describes the ability to handle things precisely or skilfully, especially in tasks that require fine motor control, such as playing an instrument, typing, or intricate tool work (Khanlari et al., 2023; Sosa et al., 2024; Woods et al., 2021).

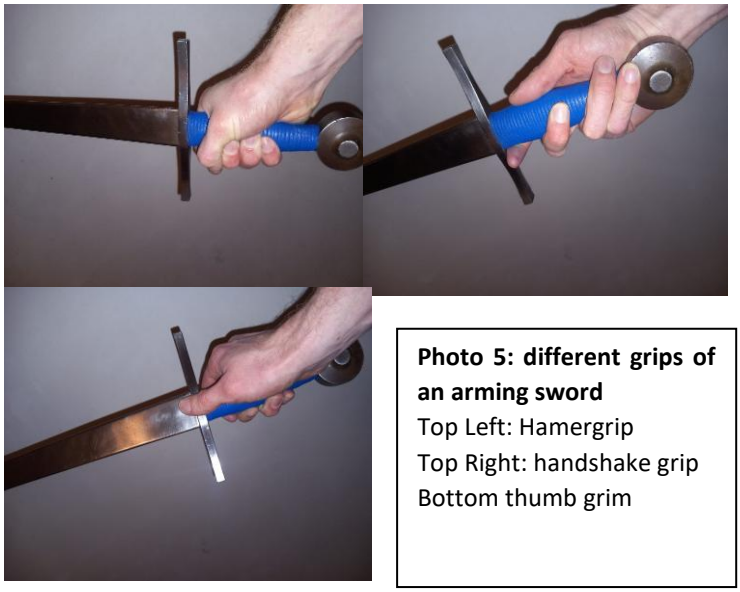

Photo 5: different grips of an arming sword
Top Left: Hamergrip
Top Right: handshake grip
Bottom thumb grim

Score: Dexterity: 0-10	
Light sparring gloves	8.5
Mediums sparring gloves	6
Heavy sparring gloves	4
Score protection: 0-10	
Light sparring gloves	4
Mediums sparring gloves	6
Heavy sparring gloves	8.5

Table 4: Dexterity and protection score. General comparison

Dexterity is extremely important in HEMA, as many manipulations and actions involving the sword or weapon require a degree of finesse, mobility, and technical precision (Gevaert, 2016; Mardsen, 2016; Brooks, 2022). This includes various grips such as the hammer grip, handshake grip, and thumb grip (see photo 5).

Generally, **dexterity and protection** are often difficult to reconcile in protective equipment and protective gloves (Khanlari et al., 2023; Sosa et al., 2024; Woods et al, 2021). Frequently, a higher degree of protection comes at the cost of reduced dexterity, and vice versa. This is largely due to several design and production factors. More protection requires more material and larger or sturdier protective plates. These components take up space, which can limit natural movements (Khanlari et al., 2023; Sosa et al., 2024. Woods et al, 2021). Thus, it becomes clear that the dexterity of heavy-duty HEMA fencing gloves is significantly reduced in most brands, while more mobile gloves such as medium or light sparring gloves offer less protection. Nevertheless, significant progress has been made in recent years.

Light gloves generally offer a high level of dexterity. This is primarily due to the reduced presence of protective materials, which take up less space. The reduced degree of freedom limit the performance of fine motor movements effectively. The preservation of fine motor control allows technically complex actions—such as specific hand and finger positions or subtle manipulations of the weapon in the hand—to be executed with little effort.

Medium gloves contain more protective elements, which take up more space. As a result, movements are somewhat more restricted than with light gloves, though not to the same extent as with heavy gloves.

Some **heavy gloves**, due to their high level of protection, become bulky and oversized. This can result in gloves so large and wide that they significantly restrict normal movement, range of motion, mobility, and dexterity of the hands. This restriction can make certain techniques difficult or even impossible to execute. In some cases, fencers compensate for the lack of mobility, dexterity, and inability to perform techniques correctly by relying on force instead.

Gloves	Technical exercise			Sparring			Tournament	
	Low int.	Med Int	High int.	Low int.	Med Int	High int.	Controlled. Med. Contact	Full contact
Light sparring gloves								
Mediums sparring gloves								
Heavy sparring gloves								

Table 5: use recommendations
Legenda: Green: presumed safe, orange, safe but under certain circumstances. Red: Considered unsafe.
* These are general recommendations based on the dexterity and protective properties of the mentioned gloves. No type of protective equipment, not even the "presumed safe" ones will ever guarantee 0% injury risk.

Performance gloves aim to combine high mobility with a high degree of protection. This allows for both adequate protection and the ability to execute techniques correctly and with precision. Examples include the Dreadnought by Red Dragon and the ProGauntlet by Cross Guard. At present, some of these gloves appear to be less durable than other heavy-duty models. While these gloves show great promise, they still face several challenges and issues, particularly in terms of durability and repairability.

DISCUSSION

In recent years, many new types and brands of gloves have entered the market. Each of these gloves has its advantages and limitations.

Due to their high degree of dexterity and mobility, light gloves are extremely suitable for technical work. However, their low level of protection offers little defence against high impacts, which may occur in high-intensity drills, sparring, and tournaments.

Medium gloves offer the benefit of additional protection. Although they influence dexterity, they often result in significantly less movement restriction and loss of dexterity than heavy-duty gloves. Nevertheless, these gloves are not suitable for some high-intensity, high-prestige, and high-risk tournaments or "winning-at-all-costs" mindset in tournaments (Chen al., 2019 ; Patenteu et al., 2023; Strotmeyer & Lystad, 2017).

Fencers and tournament organisers should be aware of risk compensation behaviour (Pless, 2016; Hagel & Meeuwissen, 2004; Finch, 2006; Van Tiggelen et al., 2008; Wilde, 1994, Wilde 2006; Wauters, 2023c). and winning-at-all-costs- mindset (Chen al., 2019 ; Patenteu et al., 2023; Strotmeyer & Lystad, 2017).. This mindset increases risk taking behaviour and can lead to more dangerous situations. Certain areas of the glove are intentionally left without reinforcements to allow for mobility and dexterity. If an impact occurs in those areas, it can still lead to injury.These behaviours can occur and increase while wearing protective equipment. Increased protection can create the illusion—for both the fencer and their partner—that they are better protected, leading to greater risk-taking. This occurs on technical, tactical, and physical levels: more risk may be taken technically and tactically, and more force may be used physically. This overcompensation might increase, rather than reduce, the risk of injury during sparring (Pless, 2016; Hagel & Meeuwissen,

2004; Finch, 2006; Van Tiggelen et al., 2008; Wilde, 1994, Wilde 2006; Wauters, 2023c).

Because of the differences in protection levels, it is recommended to use each glove type appropriately. These differences in protection levels underline the importance of using gloves in the correct context. Intense tournament fighting is in most cases not advised with light or medium gloves. During these tournaments—just like in many tournaments in other martial arts—participants often take greater risks (the "winning-at-all-costs" mentality, (Chen al., 2019 ; Patenteu et al., 2023; Strotmeyer & Lystad, 2017), and the likelihood of injury is considerably higher either for themselves or others. As such, light and medium gloves may not be sufficient to mitigate injury risk in high-intensity, high-risk, and high-prestige tournaments. Most tournaments adjust their gear requirements accordingly. However, some tournaments and tournament settings have been done with minimal equipment and light fencing gloves, (Hallebardiers, Brugge, unpublished data; Wauters, 2025) but sufficient research and data is lacking in these settings. Own research (Wauters & Vantiggelen, 2016; Wauters, 2023c) has already suggested the potential presence of risk compensation behaviour. This may indicate that increased intensities in tournaments require higher levels of protection, which in turn may escalate intensity even further, creating a progressive cycle of rising intensity and escalating protective measures. Manufacturers of Hema-equipment and organisers of Hema-tournament should be aware of this principle.

Conversely, lowering the intensity of tournaments may reduce the need for heavy protective gear, making it possible to allow for less restrictive gloves that offer more mobility and thus enable more techniques (Wauters, 2023c; Wauters, 2025) have already demonstrated that, with the right mindset, setting, and regulations, (friendly) tournaments can be held using light gloves. It might be interesting to refer to "Blossfechten" as a separate discipline in tournament fencing). Several different Belgian Hema clubs already organise such tournament formats, yet there are no detailed records of injuries. Only one report methodological report has been published (Wauters, 2025) with a small sample size without randomisation and control group.An important subfactor is that participants must have a high level of technical and tactical skill in order to make quick decisions that prevent injury to their partner or opponent—such as pulling or slowing down a strike mid-action—even if this comes at the cost of their own score. This mindset however, is often difficult to maintain in many tournament settings across different sports (Chen et al., 2019; Patenteu et al., 2023; Strotmeyer & Lystad, 2017).

CONCLUSION

Given the existence of different types of gloves with varying properties, it is advisable to use the appropriate type of glove for the corresponding type of training, fencing or sparring.

Light gloves are mainly recommended for technical drills and low-intensity sparring. Some highly technical, low-intensity, and controlled tournaments can also be conducted with light gloves, but only under strict conditions where both fencers possess high levels of technical and tactical skill. These gloves are not advised for high-intensity, high-prestige, and high-risk tournaments or "winning-at-all-costs" events.

Medium gloves provide a solid middle ground between light gloves and heavy-duty gloves, incorporating both the advantages and limitations of both categories. It is important to monitor risk compensation behaviour when using these gloves. They are suitable for low- and medium-intensity drills and sparring. In low-intensity and controlled tournaments, they may also be considered, though this again requires a high technical and tactical skill level from both fencers. They are not suitable for high-intensity, high-prestige, and high-risk tournaments or "winning-at-all-costs" events.

Heavy-duty gloves offer the best protection but provide less dexterity than the other types of gloves. This often makes it difficult to perform more complex grips, and certain techniques may become more challenging. Due to their high level of protection, they are well suited for high-intensity, high-prestige, and high-risk tournaments or "winning-at-all-costs" events—but they do not reduce the risk of injury to 0%.

High-performance gloves represent a promising balance between protection and dexterity, but the durability of current models must be improved.

With the right mindset, tournament setting, and tournament rules, it may be possible to host highly technical tournaments using medium or even light gloves, although this carries a higher risk than using heavy-duty gloves.

More research on this matter to be conducted. This may include injury profiles, injury preventive strategies, testing of used materials and equipment, and different tournament settings,

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Conflict of interest

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