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"I FELT LIKE ALL THESE OBJECTS WERE IN MY OWN HOUSE…": LEARNING THROUGH SENSES IN THE MUSEUM

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Abstract:
The benefits of multisensory learning are recognized both in the field of formal education, informal and non-formal learning environments and activities. In the case of museums and museum pedagogy learning through the senses is a key element. Furthermore, the idea of a multisensory museum is steadily gaining ground within museums and among museum professionals with the ultimate aim to enrich all visitors' museum experiences. The present paper focuses on touch in the museum. It aims to investigate primary school students' perceptions of touch in museums as well as their experience with regard to the use of permanent display cases with touchable authentic objects during an educational program in an archaeological museum in Greece. The data were obtained via: a. evaluation questionnaires filled in by the primary school students after the visit to the museum, b. semi-structured interviews by the teachers, and c. participant observation and field notes. The results revealed how the students understand and perceive the prohibition of touch in the museum in relation to aspects of cultural heritage and exhibits' protection. Furthermore, issues related to the appropriate approach of permanently accessible exhibition display cases and facilitations in the museum space were observed. Students' views about their own experience confirmed the significance of touch and multisensory activities as well as the value of the combination of sensory activities, object-based learning, play and other creative and experiential methods and activities that can lead to meaningful and memorable museum experiences.

Keywords: museum, touch, multisensory learning, object-based learning

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1. Introduction

Participating in multisensory learning activities, that is activities that involve and combine two or more senses, in order to access or express information, knowledge, etc., has multiple benefits for different learners (Baines, 2008; Shams and Seitz, 2008). The power and the value of multisensory learning are that learning through different senses, sensory modalities and strategies, multisensory activities and materials, kinesthetic methods, play, etc., create a *"reciprocal relationship between sensory input and thinking"* (Baines, 2008, p. x). It is argued that multisensory learning techniques and activities lead to more effective learning, promote learners' curiosity, engagement, motivations and achievements, enhance connections, memory and better retention of information, contribute to social interaction between learners and at the same time they make learning and teaching more enjoyable (Baines, 2008; Novak & Schwan, 2021; Shams & Seitz, 2008). Multisensory learning responds to learners with diverse characteristics (e.g., age, interests, needs, skills, abilities and disabilities) and it can also be used in different learning environments. This is of particular importance in formal, informal and non-formal learning environments and activities, as for example in schools and museums respectively (see, e.g., Baines, 2008; Kanari & Souliotou, 2020; Levent & Pascual-Leone, 2014a; Nikonanou et al., 2020; Shaffer, 2015).

Learning in the museum is intertwined with the concept of experience and many researchers have pointed out the characteristics of the museum experience, the role of the senses and the emotional dimension of this experience (Falk & Dierking, 2013; Hooper-Greenhill, 2006). The interaction with the museum space itself as a learning environment and with the objects/exhibits affects the quality of an embodied experience (Chourmouziadi, 2015; Nikonanou, 2015a). Through this interaction and experience, feelings, senses and mind are engaged leading to *"a tacit, not always fully articulated"* learning and knowledge that *"can be called upon in the future"* (Hooper-Greenhill, 2006, p. 242). Thus, museum professionals use many methods, activities, means and tools in order to promote this interaction, provide multisensory learning experiences and achieve a range of learning outcomes (Black, 2012; Hooper-Greenhill, 2007; Kanari & Souliotou, 2020; Nikonanou et al., 2020). Regarding the museum space, although there are many differences in terms of various types of museums, curatorial practices, accessibility provisions (e.g., tactile exhibits for visitors who are blind and partially sighted), use of new technologies, interactive exhibits, etc., museums traditionally are ocular-centric spaces where people go to see the artifacts and museum objects (Hetherington, 2000, 2003). However, during the last years, museum professionals investigate more and more the ways and the degree to which museums can redefine their practices in the exhibition spaces by taking into account the interaction of sensory, spatial and other elements of museum experience (Levent & Pascual-Leone, 2014b; Reden, 2015; Salmouka & Gazi, 2021; Wang, 2020). The ultimate aim of a multisensory museum is to provide enriched, multilayered and memorable learning and social experiences to all people (Eardley et al., 2016; Howes, 2014a; Levent & Pascual-Leone, 2014b).

This study refers to the case of an educational program with multisensory activities for students of primary education in an archaeological museum in Greece. Although multisensory learning is a key term in the present paper and the way that we basically experience and interact with the world (Pascual-Leone & Hamilton, 2001; Shams & Seitz, 2008), there is a focus mainly on touch in the museum. This deliberate choice is made for practical reasons and also because the presented study explores the experience of sighted children from permanent display cases with touchable authentic objects in the museum during an educational program. The following sections address: a. theoretical issues with regards to the role of touch in the museum and learning through senses in the museum and, b. the research framework of an educational program and the results based on qualitative data concerning primary education students' perceptions about touch in museums as well as their experience of touching objects in the museum's display cases designed for this purpose.

2. Literature review

2.1. Touch in the museum

The role of the senses and multisensory experience in the museum is a constantly expanding field of research, studies and practices in light of scientific insights from different disciplines, the development of new technologies and the social demands for the role of museums in contemporary society (Levent & Pascual-Leone, 2014a). The issue of the *"rehabilitation of touch"* in the museum space (Howes, 2014a, p. 259) attracts the interest of many researchers and museum professionals who study the role of touch in museums from different perspectives: historical, cultural, educational, and inclusive. Studies about the cultural history of touch revealed that touch was not always forbidden in museum collections; a prohibition was summed up in the well-known phrase "*please do not touch*" (Candlin, 2008; Classen, 2012; Classen & Howes, 2006). On the contrary, it seems that in museum collections of the 17th and 18th centuries, visitors – who were members of the upper classes – could explore through senses, touch and handle objects (Candlin, 2008; Classen & Howes, 2006). Philosophical ideas – among other popular beliefs about the mysterious power of objects – of that era supported the value of touch and the idea that handling objects should complement the *"visual inspection"* of the *"very things themselves"* (Arnold, 2003, cited in Classen, 2005, p. 276) in order to gain better access and understanding of the nature of things and the truth. Exploring objects through touch could confirm the perception of things by providing more solid information than sight, and thus *"touch functioned to correct the misconceptions of sight"* (Classen, 2005, p. 277). Similarly, touch was considered very important for the appreciation and understanding of artworks – sculptures and paintings – and also for the satisfaction and enjoyment of the museum objects. Touch provided an intimate experience and proximal knowledge through which visitors were feeling emotional and imaginative contact with people from other cultures and eras, those who had created or used these objects. Thus, touch could *"bridge space and time"* (Classen, 2005, p. 278).

The transformation of the museum into an ocular-centric space was the result of various combined factors during the process of the birth of the modern, public museum, open to wider audiences from different social classes (Bennet, 1995). Touch of museum objects and artifacts by a gradually increasing number of visitors from lower social classes was considered damaging, dirty or even unruly and disrespectful (Candlin, 2008; Classen, 2005). Certainly, a crucial factor for the prohibition of touch in museums was the development of curatorial and museological practices and the increasing interest in the protection and preservation of artifacts and exhibits for future generations. In addition, social changes, epistemological views as well as the development of visual techniques and methods in science resulted in the disappearance of touch and tactile experience in museums by the mid-nineteenth century (Classen & Howes, 2006 as cited in Candlin, 2008). A great body of scholarship and different disciplines of that era and during the 20th century established the notion of the superiority of vision – both in intellectual and aesthetic terms – over the other senses. The vision was considered as a civilized and sophisticated sense for access to knowledge and the appreciation of art (Candlin, 2006, 2008; Classen, 2005; Lee & Duncum, 2011). Thus, museums have been transformed into visual spaces and people learned to explore museum collections as spectators and observers (Howes, 2014a) by *"enlightening their minds and controlling their bodies"* (Classen, 2005, p.282) and adopting new manners of visiting museums (e.g., low voice, looking artworks from a specific distance, etc.) (Classen, 2005; Hetherington, 2003; Leahy, 2012).

Nevertheless, the benefits of touch –as well as multimodal information and multisensory activities– in the museum for different target audiences and for all visitors are recognized among museum professionals. Undoubtedly, a major topic of discussion and practices over the past decades is the access and inclusion of people who are blind and partially sighted in museums as visual spaces where touch is not allowed (see, e.g., Candlin, 2003; Hetherington, 2000, 2003; Kanari, 2015; Pressman & Schulz, 2021; Weisen, 2008).[ii] A growing field of research has also been the investigation of how touching and handling objects benefit elderly people or people with dementia (see, e.g., Arigho, 2008; Jacques, 2008; Philips, 2008; Rowlands, 2008). Touch in the museum is not or should not be considered only as a provision for visitors who are blind and partially sighted or as a *"therapeutic tool"* for specific target audiences (Weisen, 2008, p. 244). Many researchers and museum professionals stress the benefits of touch, handling objects and the role of all senses and multisensory experiences in museums for all visitors (with or without disabilities, adults, children, and students from different educational levels and settings) in terms of enhancing engagement, foster understanding, enriching museum and aesthetic experience and promoting inclusive practices and museums' democratization (see, e.g., Candlin, 2003; Chatterjee, & Hannan, 2015; Fors, 2013; Howes, 2014a, 2014b;

[ii] A detailed presentation of accessibility practices, facilitations, programs and obstacles that still exist within museums for visitors who are blind and partially sighted is out of the aims of the present paper. For further reading about issues of access, arts, education and inclusion of blind and partially sighted people in museums see, e.g., Axel & Levent, 2003; Candlin, 2006; De Coster & Loots, 2003; Ginley, 2013; Mesquita & Carneiro, 2021; Sportum, 2014; Zimmer et al., 2008.

Kanari, 2015; Krmpotich, 2019; Schwan & Dutz, 2020; Weisen, 2008). In parallel with museums' fundamental function to protect and conserve artifacts and objects of their collections, professionals from the field explore various ways to promote meaningful and memorable experiences for all visitors by stimulating different senses with the use of various methods, materials, interpretative means, new technologies, etc. (see, e.g., Candlin, 2006; Levent & Pascual-Leone, 2014a; Levent et al., 2014; Sportum, 2014; Vi et al., 2017). In this framework, "Sensory Museology" (Howes, 2014a) emphasizes the role of senses and multisensory experience in the museum space. The significance of an interdisciplinary approach and consequently innovative collaborations and practices with the contribution of different fields constitutes a critical topic within museums for the development of multisensory and inclusive practices (Levent & Pascual-Leone, 2014a; Ucar, 2015).[iii]

2.2. Multisensory learning in the museum

At the level of museum educational programs and activities, experiential learning, multimodal interpretative means, learning through senses and multisensory experiences are in the heart of museum education methodology (Nikonanou et al., 2020). The qualities of learning in the museum based on the experience of the objects themselves and characteristics, as for example their materiality (Dudley, 2010, 2010b; Hennigar-Shuh, 1999), render the museum a unique learning environment for object-based learning[iv] and creative activities (Black, 2012; Nikonanou et al., 2020). Besides specifically designed activities and programs, as for example for visitors who are blind and partially sighted (Axel & Levent, 2003), museum educators in general use a range of methods and strategies –including multisensory ones– for activities that promote engagement, expression, creativity through senses with various learning outcomes for all (Ambrose & Paine, 2018; Hooper-Greenhill, 2007; Levent & Pascual-Leone, 2014b; Nikonanou et al., 2020). Certainly there are differences among museums depending on the type of museum and the availability of space and resources. Thus, multisensory activities take place in the exhibition spaces, in open spaces of the museum (e.g., open-air exhibitions, in the garden etc.), in rooms for educational programs or in other specifically designed rooms. For example, "*discovery rooms*" are a practice within museums where visitors can explore, discover and interact with objects, replicas of exhibits or interactive exhibits that stimulate their senses (Nikonanou et al., 2020; Shaffer, 2019). Sensory exhibition spaces in museums, interactive exhibits and labs with various subjects (e.g., science, arts, etc.) are designed within museums for children, adults (with and without disabilities) and families, promoting in an inclusive and accessible way the interaction between visitors/learners/users and exhibits, learning through action and through all senses,

[iii] See also the example of the exhibition entitled "The Senses: Design Beyond Vision" in Cooper Hewitt Smithsonian Design Museum (2018), https://www.cooperhewitt.org/2018/02/27/cooper-hewitt-smithsonian-design-museum-to-present-the-senses-design-beyond-vision/, Access September 15, 2022.

[iv] Object-based learning instead of word-based learning is essential also in school across curriculum and with multiple benefits for all children (Durbin et al., 1990).

creativity, expression and entertainment (Larson, 2014; McGee & Rosenberg, 2014). In other cases, specifically designed, accessible and multisensory material is used during educational programs and guided tours in order to overcome structural and sensory barriers in the exhibition spaces as for example glass cases and exhibits that are not available to touch.[v]

As mentioned above, learning from objects is essential in museums and provides opportunities for activities that involve different senses and with various objectives. Touch and handling objects are considered valuable for objects' features that cannot be understood or felt through vision, for the development of various skills and for better exploration and understanding (Durbin et al., 1990). Tactile elements in museum educational activities respond to different learners' profiles, promote action and various connections and enhance perception, interaction and emotional engagement (Popov-Schoßer, 2013 as cited in Nikonanou, 2015a). Thus, objects (e.g., authentic objects, objects of daily life, copies of exhibits, collections of objects) are used as learning tools during educational programs in order to enrich the learning process and motivate and foster understanding and engagement (Nikonanou, 2015b). Permanent display cases with selected touchable authentic objects, replicas or other materials related to the exhibits constitute a practice within museums for sensory and multisensory activities. These display cases can be used by independent visitors, in the frame of workshops and handling sessions for all visitors and for those who are blind and partially sighted or in the frame of educational programs and tours in combination with other creative activities (Candlin, 2006; Ginley, 2013; Nikonanou et al., 2020). Another example of multisensory activities and practices is the "stations" where children can work, explore and experiment with different materials and different senses during educational programs (Talalay & Gerring, 2007). Other activities that stimulate the senses are organized based on experiential and creative activities (Nikonanou et al., 2020), visual arts, crafts, performing arts, as for example music, dance and theater/drama activities and play and in combination with each other or with other methods (Kanellopoulos & Nakou, 2015; Jackson & Leahy, 2005; Lenakakis & Panaghi, 2018; Nikonanou et al. 2020; Sarbu & Gheorghiou, 2007). The aforementioned activities and strategies contribute to a multisensory and *"embodied experience"* of the exhibits, understanding and also to personal and creative expression (Nikonanou, 2015a, p. 73). Digital technologies constitute a constantly growing field and provide further opportunities for multisensory experience in museums, as for example 3D exhibits' replicas, augmented reality, etc., (Sportun, 2014). Museums also provide educational resources that promote multisensory learning activities inside and outside the museum. Examples of these practices are backpacks with educational material, information and objects that promote self-directed activities and exploration in the museum (e.g. for families), (Nikonanou et al., 2020) and

[v] See for example the mobile showcase of the Museum of Cycladic Art (Athens, Greece) with replicas of museum exhibits, tactile material and audio guides which was designed for visually impaired visitors but it can also be used by other visitors for the enrichment of their experience in the museum, https://cycladic.gr/en/page/to-programma-se-epafi (Access September 17, 2022).

museum kits that aim to bring museums' collections to schools. They contain copies of museum objects and artifacts and other educational resources providing, thus, opportunities for multisensory activities (Nikonanou, 2015b).[vi]

Many museums also suggest through their websites ideas for multisensory activities, art making, etc.[vii] To sum up, museum educators put a strong emphasis on issues of participation, engagement, expression, action and creativity through a range of activities and learning through senses, although there are many differences among museums and their practices.

3. The framework of the study

3.1. The case of an educational program for the Byzantine Culture in an archaeological museum in Greece

The study presented in this paper was conducted in the frame of a museum educational program for primary education students. The educational program was implemented in the Diachronic Museum of Larissa in Greece and the thematic was about the Byzantine Culture. The Diachronic Museum of Larissa exhibits archeological material from the region of Thessaly (central Greece) diachronically and, more specifically, from the Paleolithic Age to the Ottoman Period. From 2015, when the museum opened for the first time, it presents a significant activity with temporary exhibitions, educational programs, conferences, events, workshops, publications, etc. In the frame of the accessibility and inclusive policy of the museum, educational programs are also organized for vulnerable social groups, schoolchildren from Special Education schools, etc. Furthermore, the museum provides accessibility facilitations for persons with disabilities, as for example showcases in the permanent collections with authentic objects for touch and information in Braille for visitors who are blind or partially sighted (Sdrolia et al., 2020).[viii] However, these showcases can also be used by other visitors.

The educational program in the museum was designed for primary education children of the 5th grade in the frame of a school project about aspects of the Byzantine Period, as for example daily life, education and Byzantine art. The thematic of the school project was related to the history curriculum of this grade in Greek Primary Education. A range of workshops and activities took place in the school-based mainly on drama/theater pedagogy (Kosti, Kondoyianni & Tsiaras, 2015; Lenakakis & Panaghi,

[vi] See also the example of the multisensory museum kit from the Museum of Cycladic Art (Athens, Greece) with materials and resources for all children. The museum kit was designed for people who are blind and partially sighted enriching at the same time the experience of all, https://cycladic.gr/en/page/to-programma-se-epafi, (Access September 17, 2022).

[vii] See for example the Tate kids website with ideas for art making with the use of different materials, the body, sounds, etc., https://www.tate.org.uk/kids/explore (Access September 22, 2022).

[viii] For more information about the museum, its collections, activities and accessibility provisions see the official website of the Diachronic Museum of Larissa http://dml.culture.gr/index.php/en/the-museum/museum-history, and http://dml.culture.gr/index.php/en/visit/useful-information (Access September 16, 2022).

2018) and with the contribution of the visual arts and music teachers of the school. Part of the project activities was an educational program in the Diachronic Museum of Larissa which was designed in collaboration with the teacher who was also theater pedagogy teacher and responsibility of the school project. The design of the educational program was based on a number of selected museum's exhibits related to the historical period which was the theme of the school project and the showcases with touchable authentic objects. The duration of the program was approximately 3 hours. Students were divided into two groups and all of them participated alternatively both in the educational tour in the space of the museum and in art and music activities in the room for the educational programs of the museum respectively (Papaioannou & Kanari, 2019). Following the methodology of the project and museum pedagogy in combination with the characteristics of the museum space (Nikonanou et al., 2020), special attention was given to students' engagement with multisensory activities in the museum and drama-based techniques (e.g., "collective character" for the students as citizens from the Byzantine Period, "Teacher-in-Role" for the museum educator). During the educational tour, students were invited to see and explore through touch authentic objects from the specifically designed showcases in the museum (see Figure 1).

Figure 1: Exploring museum's objects through touch (Authors' file photo).

3.2. The research aims

The main aim of the present study was to explore the perceptions of primary education students about touch in museums as well as their experience with regard to the use of permanent display cases with touchable objects within the space of an archaeological museum - where usually touch is not allowed or is very rare. In specific, the research questions were the following:

1) How students perceive the prohibition of touch in the museum?
2) How students responded and described their experience from the activities of touching objects of the specifically designed display cases in the museum?
3) What are students' suggestions about touch in the museum?

3.3. Participants, method and instruments of the research

In total 52 primary education students from the 5th grade attended the educational program in the museum and 5 teachers accompanied them. None of the students was blind or partially sighted. Since the educational program in the museum was part of a school project about the Byzantine Period, all the students had prior knowledge and also many relevant activities had taken place at school (see, Section 3.1.).

The evaluation of the educational program was a basic axis of its design and implementation. Qualitative data were gathered via questionnaires filled in by the students before and after the visit to the museum, participant observation and field notes, semi-structured interviews with the teachers who accompanied the students in the museum, and students' written texts with their thoughts and views after the educational program in the museum (Creswell, 2015; Isari & Pourkos, 2015). The questionnaires for the students contained open-ended questions (Qs) with regard to: a. their prior experience and expectations from the visit to the museum, b. their opinions and experience from the educational program and the activities including those with touching objects, and c. their views about further and more visits in museums and their suggestions about touch in the museum. Special attention was given to the simple language and clarity of the questions as well as to the procedure of filling in the questionnaires anonymously so that students feel free to express their opinions without having a sense that they were "examined" on their views, suggestions and opinions. The semi-structured interviews with the teachers included questions with regard to their views and opinions about: a. the educational program and the activities in the museum (including questions about touching objects in the museum), and b. their students' responses. Based on participant observation (by keeping key phrases during the educational program), the researchers wrote down their field notes in a more detailed way directly after the educational program, in order to record students' responses to the activities of the educational program (Isari & Pourkos, 2015). The data with regards to touch in the museum were gathered: a. via questionnaires filled in by the students after the visit to the museum, b. participant observation and field notes, and c. semi-structured interviews with the teachers.

In total 48 students answered the questions about touch in the museum and their experience of touching museum objects. Semi-structured interviews were conducted with the 5 teachers who accompanied the students in the museum. The data analysis was held with content analysis (Miles & Huberman, 1994) and consent was sought for the publication of the results with respect to the anonymity of the participants. In the following section part of the results is presented and more specifically the ones related to the aforementioned research questions about touch in the museum (see, Section 3.2.).

4. Results

Regarding the 1st research question about students' perceptions of the prohibition of touch in the museum (see, Section 3.2), based on students' answers to the relevant question of the questionnaire (Q1: *"Usually we are not allowed to touch exhibits in the museum. Why do you think this is happening?"*), it seems that all students perceive and understand the prohibition of touch in the museum as a way of museum objects' protection and for reasons related to: a. avoiding damage, b. value of museum objects, and c. preservation for other people (see, Table 1):

Table 1: Students' perceptions about the prohibition of touching museum objects

Categories	**Subcategories**
Avoiding damage	Avoiding accidents
	Avoiding destroying museums' objects
	Avoiding wear/deterioration of objects' aesthetic
	Avoiding wear/deterioration due to use
	Avoiding soiling museums' objects
Value of museum objects	Sacredness
	Efforts and difficulties to find (excavate) museum objects
	High cost and difficulties to repair museum objects
Preservation for other people	Tourists
	Other children

Although there is an overlapping in students' answers leading to the main concept of protection of the museum objects and artifacts, it is interesting to see how they conceive touch with regard to protection. The students consider the museum objects as "fragile" and consequently believe that touch is not allowed in the museums in order to avoid accidents and objects' damage. The words "break", "fragile" and "destroy" were the most frequent words in their answers. Other students mentioned that touch would change objects' appearance and beauty and in one case it was mentioned that touching could get museum objects dirty. In other cases, students mentioned that touch is not allowed in museums for children because they might be naughty causing damage or accidents. There was also a student who mentioned that the prohibition of touch serves to avoid damage ("break them") although s/he was not sure about that. Some indicative extracts of students' answers are the following:

> "*Because they are fragile and if they slip out of our hands can be broken.*" (St1)[ix]

> "*…to avoid some accident that could destroy these beautiful things.*" (St17)

> "*Because these objects are fragile and if we make a wrong movement, we might destroy them.*" (St4)

[ix] St1, St2…, refers to the code system used for the data analysis that is Student 1, Student 2, etc.

"*The materials from which the objects are made are very old and they became very fragile.*" (St26)

"*In order not to destroy them.*" (St5)

"*…if we touch them [the museum objects] they will change over time and they will not be beautiful.*" (St19)

"*Because if we touch them, we might break them or get them dirty.*" (St35)

"*…some naughty children could break them.*" (St10)

"*I think that this is happening in order not to break them but I am not sure.*" (St44)

The students, also, mentioned the historical value of museum objects from ancient times. Furthermore, they mentioned the valuable efforts of scientists (archaeologists) to excavate and find them, the significance of the excavations as well as the high cost to repair museum objects in case of some accident or damage as a result of touching or handling them. There was also a student who considered the museum objects as "sacred"[x] that people cannot touch in combination with the fact that some children might break them:

"*They are ancient and historical objects and they must not be destroyed" (St43). "Because they [the archaeologists] made so many efforts to find and excavate them very carefully and might be broken.*" (St8)

"*These objects are very expensive and ancient and if they break it will be very expensive to repair them.*" (St47)

"*These objects are "sacred" and we should not touch them and also some naughty children could break them.*" (St10)

Furthermore, the students mentioned that we should preserve museum objects and artifacts for other people, children and tourists:

"*We cannot touch them [the objects] so that other people and children are able to see them.*" (St12)

"*Because they might be broken [the objects] and if we touch them, people travelling from other places will not be able to see them.*" (St20).

[x] Quotation marks by the student.

Regarding the 2nd question of the research about students' response and their experience in the museum with regard to the activities of touching objects, all of them described this experience in a very positive way. More analytically, students' answers to the relevant question of the questionnaire (Q2: "*How did you feel when you touched authentic objects in the museum? Can you explain why?"*), fall under the following categories: a. emotions, b. knowledge and better understanding, and c. new experience (see, Table 2):

Table 2: Students' response and experience of touching museum objects

Categories	**Subcategories**
Emotions	Excitement
	Satisfaction
	Surprise
	Joy
	Pride
	Emotional contact
	Fear
Knowledge and better understanding	Objects' construction
	Efforts for objects' construction
	Objects' physical features - Materials and textures
	Current objects' condition
	Interest, curiosity
New experience	Sensory experience
	Rarity of touching exhibits in the museum space
	Connection of touching exhibits with the educational program

As seen in the above table (Table 2), students' response to touching authentic objects in the museum was very positive. The students described their experience as very exciting. They expressed their satisfaction and joy from this experience as one that they have never had before in an archaeological museum while other students mentioned that they felt proud of cultural heritage and artifacts from the past. There were also students who felt excited without knowing or being able to explain why they felt this way. Some students' indicative answers are the following:

"*I was really happy having this opportunity to touch objects of that period."* (St2)

"*I felt great when I touched so beautiful objects from that era*." (St8)

"*It was so nice because all these things we see in the books we were able to see and touch them!"* (St12)

"*It is so nice to touch old objects*." (St37)

"*It was surprising touching old museum objects*." (St30)

"*It was amazing that we touched objects from ancient times*." (St24)

"*I was so satisfied that we were able to touch the objects in the museum."* (St43)

"*I felt proud because there were so beautiful things that time*." (St21)

"*I felt excited, I don't know why*" (St13)

Another subcategory of students' responses was the emotional contact with the people and the exhibits' era through touching museum objects. Students mentioned thoughts about people who owned or constructed these objects and they also felt like they were the owners of the exhibits or residents in the ancient time:

"*I felt excited when I thought of those people and emperors who had these objects*." (St23)

"*It was very nice touching objects that people from that period made and we still have them alive*." (St27)

"*When I touched the objects, I felt very nice thinking of people who used them in the ancient time*." (St46)

"*I felt like I was a resident of the Byzantine period and all these objects were in my own house. It was so beautiful… somehow, they [the objects] enchanted and took you to another era" [travel through time].* (St4)

"*I liked it very much because I travelled to another era."* (St14)

"It was like I was living in that era or in that place." (St18)

Two students mentioned that at the beginning of the educational program were afraid of touching the museum objects and one of them finally chose not to touch the objects of the specifically designed display cases:

"*At the beginning, I felt a little scared, but after a while, I got excited because I had heard so many stories about these objects*." (St10)

"*To tell the truth, I didn't touch them because this is not allowed*." (St44)

The students also mentioned a better understanding of museum objects through touching with regards to the objects' construction, their materials, different textures and also their current condition. In other cases, it was mentioned that touching objects aroused their curiosity and interest:

"*It was very nice because we touched them and we saw how people constructed them.*" (St3)

"*I felt very nice because I wanted to touch the exhibits and see how they constructed them."* (St7).

"I felt great because the objects had strange textures." (St22)

"*It was very nice […] and when I touched them [the objects] I understood how people were making them.*" (St28)

"*When I touched the exhibits […] I felt very nice and I understood how much effort they had made in order to construct them*." (St34)

"*I saw that they are still in good condition*." (St30)

"*I was very curious to touch them*." (St40)

The majority of the students answered that touching museum objects was a new experience and they mentioned issues with regard to the sensory experience itself and the unique and rare opportunity to touch exhibits in museums:

"*I felt great because I touched […] I felt them*." (St11)

"*I liked it because I felt their touch.*" (St5)

"*I felt that I touched*." (St47)

"*I was very excited because it was the first time that I touched exhibits in a museum*." (St1)

"*It was very nice because in no other museum we can touch exhibits and objects.*" (St19)

There were also students who connected or interpreted this opportunity as part of the drama/theater activities of the educational program or as an exception and a way for better understanding that it is allowed to children:

"*I felt wonderful! People in the museum let us touch them because we were in role and they wanted us to understand the objects better*." (St33)

"*It was very nice because the elder ones have learned them in school…We are children and we must learn about them.*" (St7)

"*They let us touch the objects because they wanted [museum staff] us to learn about them.*" (St11)

"*People of the museum were very good and kind and they made an exception.*" (St23)

The teachers – based on their own answers in the relevant questions of the semi-structured interviews – described their students' experience of touching objects in terms of: a. emotions, b. exploring through touch, c. contribution to the educational program, and d. awareness for persons with disabilities (see, Table 3):

Table 3: Teachers' views about their students' experience of touching museum objects

Categories	**Subcategories**
Emotions	Enthusiasm
	Joy
	Curiosity
	Hesitance
Exploring objects through touch	Hesitant touch
	Handling museum objects
Contribution to the educational program	Connection with drama/theater activities
	Tangible experience
Awareness for persons with disabilities	Braille code
	Accessibility of persons with visual impairments

According to the above Table (Table 3) teachers confirmed the qualitative elements of their students' experience of touching objects. They mentioned that this experience was unique for the students describing their enthusiasm, curiosity and the joy they felt from this experience. Some teachers noticed that many students at the beginning of these activities were hesitant to touch the exhibits of the display cases and they needed to be sure that they were really allowed to explore through touch the museum objects:

"*The children were excited! It seemed strange to them to be able to touch objects in the museum. They have not had another similar experience.*" (T5)

"*They were very curious and it gave them great joy although at first, they were a little hesitant ... they asked if this was really allowed and then they got excited*." (T3)[xi]

The teachers also commented that the students at the beginning were touching very slightly the surface of the objects and after feeling sure about this activity, they started to touch the objects without being afraid and in a more exploratory way:

"*At first, they looked at them and touched their surface gently […] they did not move them but gradually they lifted them, they were exploring them… I think that the thin rope [with*

[xi] T1, T2…, refers to the code system used for the data analysis that is Teacher 1, Teacher 2, etc.

which the objects were tied on the surface of the display cases] contributed in order to not be afraid to touch them" (T2).

This was also observed during the activities of touching objects. The students had to be encouraged to touch the objects with different hand movements, as for example to lift the objects, to explore them through touch from different sides, tracing with fingers, to feel non-visual object's features (e.g. weight, etc.), to describe the materials and textures or issues related to the objects' construction. Furthermore, the teachers commented that the opportunity of touching museum objects was a tangible experience which contributed to the educational program and in specific to the drama/theater activities:

"*It suited their role very well ... they were "Byzantines" and they also captured their objects*" (T5).

"*It was all very tangible ... it brought their roles to life*" (T1).

In addition, the teachers mentioned that the showcases with the touchable objects and the information in Braille next to these showcases gave to the students the opportunity to see texts written in Braille, to ask about it and in this way to be aware of museum visitors who are blind and how they can touch museum objects having also information in Braille:

"*They were impressed that next to the display cases there was information in Braille and they also touched the text*." (T1)

"*They understood that these objects are for visitors and children who are blind so that they can also come to the museum*." (T2)

Indeed, it was observed that some students noticed the information texts in Braille and they were interested to see how it feels to read Braille. They were touching the texts and they were asking questions. This gave the opportunity – although it was not in the aims of the educational program – to comment on accessibility issues and that all people should have access to the museums' exhibits and information.

Regarding the 3rd research question concerning students' suggestions about touching objects in the museums, based on their answers to the relevant question of the questionnaire (Q3: *"Would you like to touch objects in the museum? Can you explain why?"*), the vast majority of the students answered that they would like to touch objects in the museum. Only one student stated that s/he would not like to touch museum objects due to fear of some damage and not being able to visit museums again:

"*The truth is that I would not touch museum objects because if I do any damage, I will not be able to visit any other museum again*." (St10)

The reasons for which the students would like to touch museum objects are the following: a. different experience, and b. better understanding (see, Table 4).

Table 4: Students' views about the reasons for which they like to touch museum objects

Categories	**Subcategories**
Different experience	Sensory experience
	Objects' rarity, authenticity, antiquity
Better understanding	Objects' construction
	Materials, textures, shape
	Design (relief)
	Use
	Understanding of people from other eras
	History
	Memory

The students mentioned that they would like to touch museum objects because of the sensory experience. They have also referred to the different, exciting and rare experience of touching very old or authentic objects in the museums. According to their answers, exploring museum objects through touch would help them to better understand how the objects were constructed and their materials, and to feel their textures, shape and design (relief). Other students mentioned that touching objects in the museum would contribute to a better understanding of the people who were using these objects in ancient times and history. Some indicative answers of the students are the following:

"*Of course, I would like to touch objects in the museum because I like this sense.*" (St5)

"*We feel better when we feel their sense.*" (St13)

"*It would be so nice to touch!"* (St35)

"*It is better when you touch.*" (St37)

"*Because it is nice to touch objects from old periods of history.*" (St1)

"*It would be great to touch such rare things.*" (St19)

"*Yes, because these objects are real and very important.*" (St27)

"*I understand them [the museum objects] better in this way.*" (St17)

"*Yes [I would like to touch], because I would be able to understand what the materials were made of and how they look like from the outside [exterior surface].*" (St6)

"*I would like to feel the sense of the materials that people were using.*" (St9)

"*I would like to learn about the materials that people were using*." (St20)

"*Because I am wondering what they are made of.*" (St26)

"*I would like very much to touch museum objects to understand their textures and their shape*." (St22)

"*Because I am curious to see objects' relief.*" (St30)

"*Because I would be able to feel their shape*." (St37)

"*I would like to touch objects because I would understand exactly how they were constructed*." (St4)

"*I would like to touch objects because I could understand their use.*" (St44)

"*I would like to feel peoples' life.*" (St45)

"*I would like to touch museum objects because I could understand better their history*." (St7)

"*Yes, because you can travel with your heart to other eras.*" (St14)

"*I would understand better how it was that period."* (St41)

"*I would like to touch museum objects to learn more about ancient times*." (St48)

"*Yes, because I will remember more about the period these objects were made.*" (St39)

Finally, the last question of this part of the questionnaire (about touch in the museum), asked students for their suggestions about the ways in which museums could allow touching in their spaces (Q4: *"Can you think about what museum could do in order to allow touching museum objects?"*). The majority of the students wrote their own suggestions and thoughts. One student did not suggest something because s/he believes that touching in museums is impossible:

"I believe that this is impossible because even with the slightest movement the exhibits may be destroyed." (St26)

As can be seen in the table below (Table 5), students' answers referred to the following: a. museums' infrastructure, and b. the process of activities with touching objects and the role of museum staff and teachers.

Table 5: Students' suggestions about touch in the museum

Categories	**Subcategories**
Museums' infrastructure	Specifically designed display cases with touchable objects
	Replicas, copies
	Other objects
	Fragments of objects
	Open display cases
Process of activities with touching objects	Guidance by the museum staff (museum educators)
	Instructions and watching by museum security staff
	Guidance and watching by teachers
	Personal responsibility

Regarding museums' infrastructure, some students suggested practices similar to those they met in the museum, as for example open showcases with sand and objects tied with a thin thread (see, Figure 1), as well as other ways of objects' protection. Students also suggested replicas, exact copies of artifacts made with the same material, less valued objects or objects that are not in the main exhibitions or even fragments of objects available to touch. Fewer glass showcases and more open showcases were also among students' suggestions:

"*Museums could put sand on specific surfaces and put the museum object on the sand*." (St32)

"*… to have the museum objects tied with transparent thread*." (St40)

"*Museum could have the museum objects tied so that we could touch them without carrying them away*." (St46)

"*They could put the objects in soft surfaces*." (St1)

"*They could have something around the objects to protect them*." (St17)

"*They could make new objects exactly as the exhibits with the same materials*." (St6)

"*…to make replicas so that we can touch them, not the real ones [the authentic]."* (St13)

"*They could make copies from clay or iron*." (St20)
"*Museums can make identical objects and give them to us in order to touch*." (St14)

"*Museums could have some objects of less value in order to touch them*." (St28)

"*They could have fragments of objects so that visitors can see and touch them*." (St29)

"*Museums could have some open display cases, not only with glass*." (St16)

The students, also, mentioned the role of other persons (museum staff, teachers) suggesting various ways in which they can facilitate the process of touching objects in the museums with respect to the objects' protection. They proposed that museum staff should provide guidance, holding the museum objects so that people can touch them carefully or watch people during the process of handling objects. Similar suggestions were also made for the museum security guards. Furthermore, and according to the students' suggestions, teachers could provide these directions and also watch the students as they touch museum objects. The students also proposed the careful approach of the touchable museum objects (one by one and not all together) and they mentioned the personal responsibility of each visitor:

"*People from the museum can hold the objects so that we can touch them slightly.*" (St5)

"*The people who are responsible for the exhibits in the museum could be there and watch the visitors when they touch objects and the objects as well.*" (St9)

"*Museums could have some people [museum staff] to tell us what we can touch.*" (St11)

"*Security guards of the museum should stand in front of these "sacred"*[xii] *objects.*" (St10)

"*The children should not go all together [to the display cases with the touchable objects], they should go one by one and there should be someone there to watch them.*" (St8)

"*Museum guards should be there watching us and also our teachers could guide and watch us when we touch the museum objects […] we should also be very careful with museum objects.*" (St12)

5. Discussion

The present study falls under the ongoing discussion in the field of museums about opportunities for multisensory experiences for all visitors (Levent & Pascual-Leone, 2014a). It investigates primary students' perceptions about touch in the museum, their experience of touching museum objects in an archaeological museum as well as their suggestions for more similar opportunities within museums.

The role of touch in the museum has a long history and it is generally conceived as a prohibited sense for reasons of museum objects' protection and preservation (Hetherington, 2000, 2003). This notion was clear in the students' perceptions about the reasons that usually touch is not allowed in the museum space. The results of the first research question ("*How students perceive the prohibition of touch in the museum?*") revealed that the students, based on their prior experiences and beliefs, recognize the need for

[xii] Quotation marks by the student.

artifacts' protection and conceive the prohibition of touch in the museum as a basic rule in the museums for reasons of exhibits' preservation and protection (Kenkmann, 2011). The students reported that museum objects are "fragile" regardless of their materials. They believe that touching museum objects may cause damage to them and since they are "valuable" and "ancient" we should definitely protect them in order to preserve them for other people and future generations.

Regarding the second research question ("*How students responded and described their experience from the activities of touching objects of the display cases in the museum?"*), all students described their experience of touching objects in the museum with very positive comments, and an equally positive view was expressed by their teachers. The students reported various emotions and reactions (e.g., satisfaction, excitement, joy, surprise, etc.) from their experience of touching authentic objects ("real objects") in the space of the museum. There is a lot of discussion about "authenticity" within museums which is considered one of the main characteristics that affect museum visitors (Schwan and Dutz, 2020; van Gerven et al., 2018). According to Nakou (2001), authentic objects are directly connected with the historical period, the social and cultural context within which they were made, with specific circumstances as well as with the people who used or created them. Thus, authentic objects in museums have the "power" to move and fascinate museum visitors by providing direct experiences and connections not only with the past, but also with the present (Nakou, 2001; Schwan & Dutz, 2020). Based on the students' answers, it seems that touch contributed to this connection and emotional contact with the past and the people of the historical period which was the thematic of the educational program they attended. The students reported thoughts for the people who made and used objects in the past, a sense of familiarity and feelings like being residents of that era. "*I felt like all these objects were in my own house"* was a student's indicative answer (which also inspired the title of the present paper) that shows a stronger emotional contact and relation between students and museum objects. This kind of relationship has also been reported by other researchers with regard to seeing authentic objects and museums (Hohenstein & Moussouri, 2018; Nakou, 2001; Schwan & Dutz, 2020; van Gerven et al., 2018). Furthermore, the students mentioned a better understanding through touch in terms of specific objects' characteristics, for example, the materials and textures, how these objects were constructed and in relation to the efforts of people from that era who made these objects.

Another aspect of students' experience from touching museum objects was the connection, not only with the thematic, but also with the drama-based activities and techniques of the educational program (see, Section 3.1.). Some students mentioned that they were allowed to touch museum objects because they were "in role" and in order to better understand the museum objects. Teachers also commented that touching museum objects "brought [students'] roles to life" and that sensory activities were very suitable and enhanced their "roles" as people from the Byzantine Period. The sense of ownership and empathy with regard to history and drama-based activities and techniques has been the subject of relevant researches both in formal education and non-formal learning

environments, as for example in museums (Jackson & Leahy, 2005; Kosti et al., 2015; Lenakakis & Panagi, 2018). It can be argued, as Jackson and Leahy (2005) state, that the incorporation of different techniques and activities –theatrical techniques and elements, handling objects, and educational guided tours– fostered students' active learning and engagement.

The students, also, mentioned the very sense of touch *("I felt them", "I felt that I touched"*) and the experience of touching objects in the space of the museum as a new and exciting sensory experience. However, students' hesitance to touch and handle the touchable authentic objects was observed by their teachers, and the authors and it was also mentioned by some students, although it was clear that this was allowed. There was also a student who, despite the encouragement to touch and handle the touchable objects, s/he finally decided not to touch them. This is in line with other previous researches and studies in the case of adults as museum visitors. Falk and Dierking (1992) mention that even when it was clearly explained that they were allowed to touch and handle museum objects, they chose not to touch them. The students needed encouragement to feel sure that they were really allowed to do so. They were also encouraged to handle and explore the objects through different hand movements, not only by touching their surface slightly. Furthermore, questions were necessary so that students express and describe their feelings or the information they could extract from touching the objects (e.g., textures, materials, relief, etc.). Generally, sighted persons use their touch in different ways than those who are blind (Revesz, 1950 as cited in Papadopoulos, 2005). The sense of touch is often taken for granted or overlooked, without thinking about the need or the value to work on it or develop or improve it.

Furthermore, it seems that the museum space itself – and specifically that of an archaeological museum – and the dominant rule of not touching museum objects combined with the lack of students' previous sensory (touch) experiences in museums, affected them. Museums have qualitative differences from schools (Hooper-Greenhill, 2006; Kenkmann, 2011; Nikonanou, 2015c) and also differ in terms of content and collections, ideological background, etc., as for example in the case of archaeological museums (Chourmouziadi, 2006). Many students reported the "value" and the "rarity" of the "ancient" and "very old" museum objects. An interesting answer by a student was that touch is not allowed to children and s/he mentioned that museum objects are "sacred" and that s/he would not like to touch museum objects due to fear of possible damage and not being able to visit any other museum again. Although museums over the past decades have been transformed into visitor-centered spaces with the use of a range of methods that promote visitors' engagement (Black, 2012; Nikonanou et al., 2020), it seems that there are still old perceptions about museums and museum contents as *"museum temples*", sacred spaces and *"inviolable"* artifacts beyond *"ordinary human interaction"* (Classen, 2005, p.282). Similar perceptions about museums as *"temples of art"* and archaeological museums as spaces of ancient art that promote a country's civilization have been identified in the case of primary education teachers in a previous research in Greece (Andreou et al., 2008). In addition, the touchable objects were not "portable"

objects used as learning tools during the educational program (see, Section 2.2.). They were exhibited in the space of the museum's permanent collections next to other display cases and other exhibits (e.g., sculptures, mosaics, etc.) which were not available for touching. Thus, even if students had previous experiences of handling objects in school as educational material, the space and the context of the exhibition affected the way that students handled the touchable objects in the space of the museum.

Regarding the third research question ("*What are students' suggestions about touch in the museum?"*), all students (apart from the one mentioned above) would like to touch museum objects. The reasons for which the students would like to touch objects in the museum space include the very sense of touch considering this sensory experience as an added qualitative element in their museum experience ("*We feel better when we feel their sense"*) in combination with the rarity of museum exhibits. The students, also, mentioned that through touch they would better understand museum objects' features and the people who made or used these objects and even that they would better understand the historical period in which they were created. Students' opinions about touching in museums and the way that they described their experience indicate how multisensory activities can promote their motivation and their engagement in the learning process and enrich their experience in the museum.

Students' suggestions about how museums could provide opportunities to touch objects complement how they recognize the importance of protecting cultural (tangible) heritage and artifacts. The students suggested various means, as for example specifically designed display cases, and other objects that could be touchable, replicas or even fragments of original objects. Regarding authentic objects and replicas, Schwan and Dutz (2020) in their research on different types of museums found that museum visitors could accept replicas within museums in specific cases, as for example when the exhibits or parts of them can be easily destroyed or damaged, when the authentic, original objects are not available or do not exist and also when the replicas can contribute to the completion of an exhibition, to better understanding, etc. In the case students' suggestion for authentic objects' fragments, it seems that they could contribute to the sensory experience with authentic objects. Van Gerven et al., (2018) in their research in natural history museums found that children between 8-12 years old valued fragments of original objects. Besides museums' infrastructure and facilitations, the students, also, commented on the need for a carefully designed process of touching objects, for example approaching the display cases with the touchable objects one by one, the need for guidance by the museum staff or teachers about what exhibits they can touch as well as the personal responsibility of each visitor.

The small number of participants from one school in the Greek province, the lack of students' prior experiences of touching museum objects in museum space, the type of the museum –and the specific case of museum– and the exhibits (i.e., archaeological museum, archaeological material and exhibits), cannot allow generalizing the results about the ways students respond to touch activities in different museum contexts as for example in other types of museums, collections and exhibits. Regarding the process of

touching the museum exhibits, it is important to note that this was not a carefully designed guided haptic exploration, but rather an encouragement for students to dare to touch the objects in a more exploratory way without being afraid and express themselves with prompts and relevant questions.

Furthermore, although students mentioned a better understanding with regards to objects' specific features, their construction and their historical period, the investigation if and to what extent touching and seeing museums objects at the same time really contributed and enhanced students' knowledge or reinforced the recall of specific information was not in the aims of the present study. However, based on the students' responses and answers about touch, specific objects' characteristics, their curiosity, excitement and connection of the activities of touching objects with the drama-based techniques, it can be argued that touch and seeing museum exhibits, multisensory activities and drama-based activities contributed to their engagement in the learning process.

6. Conclusions and suggestions

Students' perceptions and responses with regard to their experience of touching objects within the space of museums reveal the ways that students recognize the importance of the museum exhibits in terms of preservation for future generations and avoiding damage due to touch. On the other hand, their answers reveal how touching objects within the space of a museum enrich their museum experience. The way that students responded to touch activities as well as their comments and suggestions showed that there is still a lot of space for objects' exploration and experience through touch by sighted children.

Learning is an active process (Hooper-Greenhill, 2007) and activities of touching museum objects do not take place in a vacuum. The context in which touching and multisensory activities take place, the type of the museum, the content of museum collections, the thematic of an educational program or tour and the prior knowledge and experiences of children are considered essential factors for learning and experience in the museum (Falk & Dierking, 2013; Hein, 1998). The spatial position of the touchable display cases, clear signage in the museum space, the number and the type of the touchable museum exhibits in terms of variety (e.g., size, dimensions, textures, materials, etc.) and how these elements promote learning with regards to the thematic of the educational program and learning outcomes is also important. Furthermore, how touching museum objects is contextualized and incorporated within an educational program is of crucial importance. The degree to which activities of touching objects are complemented with other information and connected with other methods and activities of museum pedagogy that promote understanding and expression should be taken into account. The process of exploring museum exhibits through touch (less or more guided), the provided time, the ways that children are supported to connect the sensory stimuli with the educational program, their own experiences and knowledge and also how they are encouraged to

express and share their opinions and feelings, to think, describe, ask questions and interact with the exhibits and with each other, are all critical parameters.

According to de Coster and Loots (2004, p.330), "*touch is a sense with unique characteristics"* and should not be considered as a substitute for sight but as a source of knowledge, experience and enjoyment. Thus, touching objects in the museum space should not be considered as an added or separate activity, but rather as an integrated part of the design of an educational program. Further research about the context in which multisensory activities take place, touching museum objects and object-based learning in combination with other methods of museum pedagogy should be further developed and enrich the existing relevant studies.

Students' suggestions with alternative ways of touching objects in the museum space confirm that the incorporation of tactile exhibits that promote multisensory learning experiences in the museums should be expanded for all. This is of particular importance also in the cases of school and other groups of individuals with and without disabilities (e.g., with and without visual impairments), (Kanari, 2015). The aforementioned are in line with the principles of the Universal Design for Learning (UDL) framework that aims to promote and enrich learning experiences for all learners by providing various tools, strategies and multimodal means and methods for content's representation and learners' action, expression and engagement in various learning environments (CAST, 2018; Rappolt-Schlichtmann & Daley, 2013).

As Wang (2020, p.1) states *"museum experience is a multilayered journey that is proprioceptive, sensory, intellectual, aesthetic and social".* Challenging the dominance of sight within museums and providing opportunities to explore museum contents through touch and other senses in the frame of carefully designed exhibitions, educational programs and multisensory activities, techniques, methods and tools should foster museum experience and learn for all museum visitors.

Conflict of interest statement

The authors declare no conflicts of interest.

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