Insight on Recycled Textiles: A Dive Into Denim

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Abstract

This research was conducted to understand better how denim is recycled and the extent of knowledge and emotion consumers have towards the recyclability of denim. Previous research on this topic has been conducted to comprehend how denim is recycled and the scientific makeup of denim and its life cycle. We used facial recognition technology to read the faces and emotions of our research participants to see how they reacted to a series of photos and a video, all relating to denim recyclability. The goal of our research was to be able to convey positive emotions about denim being recycled and a negative correlation when viewing denim waste. This data would show that consumers are on the side of denim recyclability and a path toward waste reduction. Our findings indicate that while the positive emotion is shown towards the visuals, there was also an evident display of negative emotions when viewing the visuals, which we have concluded portrays a lack of understanding and a margin for human error. That being said, there were a few errors we found to be prevalent within our research, such as limited participants, misunderstanding of the purpose of the experiment from the respondents, and visuals that can be misleading or non-effective.

Introduction

One of the most significant obstacles today is finding new forms to recycle textiles. Denim is one of the most recent growing textiles being recycled because it is typically made of 100% cotton. But, a combination blend of fibers like polycotton will not allow the textile to be recycled. Blended fibers cannot be separated once blended because they are spun into the same variant. The majority of synthetic fibers can not be recycled because they do not naturally decompose. That leaves the industry with minimal amounts of fibers they can recycle, being

cotton, silk, and wool, but each of these fibers needs to be 100% that fiber. Where a small number of textiles can be recycled, only 15% of materials are recycled each year. We wanted to focus on this issue of recycling more inclusively because the percentage is so small. By starting at a specific textile, we can track and follow the lifecycle of this fiber that everyone has in their closet. Denim will not go away anytime soon, so finding the different processes and understanding the consumer's behavior toward it is vital to change the environment in the future. If consumers disagree with the processing of recycling, then companies will not proceed to implement processes to help reduce waste. But, if consumers hold recycling valuable, then companies will have to take better care of their waste. Keeping an environmental responsibility is crucial because we all live on this planet, and we need to take care of it the best way we can.

Recycling is only one form of helping reduce waste, but it is a step in the right direction. Companies and certifications are in place to help with this process, like Fabscrap and the B-Corp certification. Companies need to find a social and environmental responsibility regarding their textiles waste because it is filling landfills. When materials stay within landfills, they can pollute water and the soil, leaving harmful effects on humans and animals. It is essential to track the recycling process and see how consumers react to it regarding denim. Consumers are the first step in the change of recycling and creating less waste within textiles. By educating and changing the form in which consumers buy, we can implement better laws for companies to abide by. Denim is a focused material because the industry for denim products is so large. Denim is a material that has the potential to be 100% recycled or biodegradable. Finally, our hypothesis states that most of the participants in our experiment will feel positive emotions when being exposed to recycling processes. At the same time, they will experience negative emotions when exposed to non-recycled methods.

Literature Review

We found various studies to understand better the denim recyclability process and its importance throughout the research process. These studies were all conducted for different reasons, but all have a particular aid in our research.

Jepara, a town in Indonesia, produces chairs made from wood with varying textiles for their upholstery. Fajarwati, Caroline, Rafli, and Auliawan (2021) use recycled denim as the primary textile for the upholstery for their research in an attempt to reduce the amount of denim waste and aid in the increase in sustainability within the fashion industry. This study is a useful incorporation for our research due to its direct relation to first-hand textile recycling.

As denim recyclability sounds, it predominantly occurs post-consumer, yet a study shows the importance of noting where the root of the problem lies. "It is necessary to systematically evaluate the environmental impacts of the denim fabric from a life cycle perspective to identify the potential opportunities to improve the sustainability of the denim industry" (Fidan et al., 2021). These studies aim to increase awareness regarding textile waste, predominantly denim, identify the root of the problem, and begin sustainable efforts from there. Rather than discussing recyclability, this source provides insight on how denim could potentially be more sustainable from the start.

Research done by Jamshaid, Rajput, Zahid, Asfand, Basra, and Ali (2020), identifies the comparisons of the functional properties of woven and knitted denim fabrics. In their research, they found the similarities and differences between the fabric properties. This study is helpful in our research because it lets us know which types of denim should be used in specific recycling processes.

A study regarding the impact of denim on the environment when the consumer has possession: the goal of the study was to spread awareness to the consumer to reduce waste emission through over washing. McQueen, Batcheller, Moran, Zhang, and Hooper's work is beneficial to our research. Rather than discussing post-consumer denim, the study educates the importance of the time period in which the consumer owns the denim.

One study focuses on the effects of slow fashion denim as opposed to the effects of fast fashion denim. "The purpose of this study was to develop a slow fashion design model using the house of quality (HOQ) which would provide fashion designers a tool to improve the overall sustainability of denim jeans for Y generation consumers" (Nergis et all., 2017). This study is noteworthy because it portrays the difference between the effects of quality denim versus cheaply made denim.

Similar to a previously mentioned study, Selin (2021), conducts a study surrounding the water properties of denim. This study is different from the other though, in the sense that its main idea is surrounding water properties as opposed to comfort properties. These findings can be used in our research to conclude that there are many factors that play a role in what denim is recycled and the different uses for varying types of denim.

Our research is based off denim recyclability as a whole, and through our sources, we have gathered many findings from studies about varying properties of denim and how denim can be recycled. All of this is crucial to our work in the sense that we have a better understanding of denim recyclability as well as the many factors we learned during our research. Reviewing the literature we found, we were able to incorporate our new knowledge in our experiment, leading to better results.
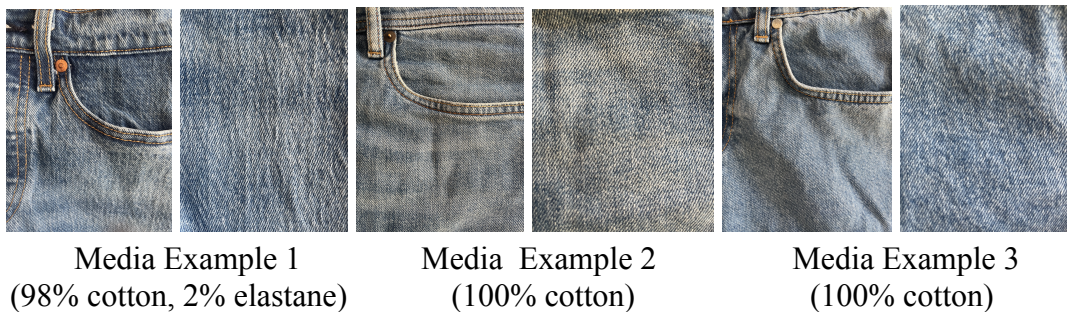
Methods and Materials

Based on facial recognition technology, we are experimenting to prove the consumer reaction toward the lifecycle of denim. We chose one one-minute video through the experiment, three different types of denim made from other fibers, and one picture of denim being recycled. These various examples of different kinds of denim demonstrate both recycled and non-recycled denim. One of the group members took the three pictures of denim being used and was not taken from the internet. First, we found it essential to know the exact fiber blend of the denim to determine if it could be recycled or not. We wanted to tell if the participants could mean the difference between natural and synthetic denim fibers through these pictures. Raw denim fibers like cotton can be recycled, so people must be able to tell the visual differences between the fibers. Secondly, one of the pictures shown is of the life cycle of recycling denim; we hoped for a positive reaction from the picture. Finally, the video showed the whole process in depth of how they break down old denim and remake it into new fabric sheets. We found this video to be essential to incorporate because it gives the participants a better understanding of the lifecycle of denim.

The emotions that will be tracked during this portion of the experiment will be joy, anger, sadness, disgust, surprise, and fear. We can see the participants' feelings during a specific part of the video by monitoring these different emotions. The video will be completely silent because we don't want to prey on other aspects of the senses to influence emotion except for sight. If the participants see differences between recycled and non-recycled denim, we will see a positive reaction toward recyclability and an adverse reaction toward non-recyclability. Our method primarily relies on sight throughout our experiment; by focusing on one aspect of the senses, we can tell how strong sight influences our participants when looking at denim. By only observing

this aspect in the experiment, we can out lie any other variable for different reactions within our results.

Results and Discussion

To gather the data for the experiment, we divided the emotional response graphs into 15 different sections and counted the number of positive spikes within each area. The highest possible number achievable was 15, and the lowest was 0 for emotions not evident. Next, we found the total number of spikes and divided them to see the highest emotion for each piece of media.

Media Example 1
(98% cotton, 2% elastane)

Media Example 2
(100% cotton)

Media Example 3
(100% cotton)

The first media presented was a photo of denim made with 98% cotton and 2% elastane. The highest average emotion shown by the participants was sadness, which correlates with our prediction that denim made with fibers other than cotton would cause an adverse reaction in the viewer. The second media piece was a photo of denim made out of 100% cotton, but the results from the data showed anger being the emotion presented the most. This result does not correlate with our prediction that denim made from 100% cotton would cause a more positive reaction than a negative one. The third media piece was also denim made with 100% cotton, but it did not result in the same negative emotion that example 2 evoked. Joy was the emotion that our

participants felt the most when viewing example three. This data supports our hypothesis that denim made with 100% cotton fibers will result in higher positive emotions from our participants. Since both pieces of media containing 100% cotton resulted in different positive and negative emotions, we can conclude participants could not notice the difference between natural and synthetic denim fibers by looking at pictures. To improve this in the future, we would want to incorporate a touch section so participants could feel the fabric hand while viewing the media. In addition, incorporating fabric haptics may help participants determine the fiber content of the denim presented.

Media Example 4

Our fourth media piece showed the recycling process of turning plastic waste into fibers for textile use. We wanted our participants to display positive emotions since this is a process leading to a sustainable practice, but our participants expressed disgust and fear the most. We hoped our participants cared about recycling fibers and would show that through positive emotion, but other factors like the amount of time to view the media and lack of clarity of the content could have contributed to more negative emotion. The fifth and final piece of media was a short video that showcased the whole process of recycling old denim materials into new textiles by reusing the fibers. Negative emotions like disgust and fear were present at the beginning of the video for our participants which made sense since they were viewing massive amounts of textile waste. However, by the end of the video, our participants displayed more joy than disgust once seeing the final successful product. This emotional reaction from the participants aligns with our prediction and what we anticipated the results would be. Our video is

showing the denim recycling process evoked more positive emotions from our viewers than negative ones because the recycling process is positive overall.

Conclusion

Our research project was based around denim as a material that has the potential to be 100% recycled or biodegradable depending on its fiber composition. Our research is based on denim recyclability as a whole, and with our sources, we have gathered many findings from studies about varying properties of denim and how denim can be recycled. We conducted research by presenting our participants with different media pieces, all regarding different aspects of denim and its recyclability. We hypothesized that the majority of the participants in our experiment would feel positive emotions when being exposed to recycling processes. However, at the same time, they will experience negative emotions when exposed to non-recycled methods. We also hypothesized participants could tell denims fiber content by just viewing an image. The data collected during the experiment showed that participants had a more positive reaction when seeing denim being recycled but could not determine the fiber content of three different denim examples by just looking at the media.

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