2006

Analysis of bread bag closures for individuals with rheumatoid arthritis

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Master's Theses. 2904.

DOI: <https://doi.org/10.31979/etd.hv75-3r39>

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ANALYSIS OF BREAD BAG CLOSURES FOR INDIVIDUALS WITH
RHEUMATOID ARTHRITIS

A Project Report

Presented to

The Faculty of the Department of Industrial and Systems Engineering

San Jose State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

by

Ruth A. K. Loewenhardt

May 2006

UMI Number: 1436930

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ABSTRACT

ANALYSIS OF BREAD BAG CLOSURES FOR INDIVIDUALS WITH RHEUMATOID ARTHRITIS

by Ruth A. K. Loewenhardt

The purpose of this study was to analyze four different plastic bag closure devices to determine if there was a difference in their ease of use for individuals with Rheumatoid Arthritis (RA) between closures currently on the market and an autoclave bag closure currently in use in medical laboratories. This was based on research into issues experienced by individuals with RA and their abilities to perform activities of daily living. This study evaluated the issues of opening and closing bread bags so that they are accessible to people with functional limitations due to the effects of RA. It was determined that the autoclave closure is not a preferred instrument for use by individuals with RA due to the difficulties in small object manipulation, the strength required to use the device and its unfamiliarity. However, closures currently available pose considerable frustration to the user and need to be re-evaluated.

ACKNOWLEDGEMENTS

The author would like to acknowledge the Pleasanton Public Library, Steven Eagle, and the staff of Kottinger Place senior residence in Pleasanton, California, for the use of their facilities for part of this study. In addition the author would like to acknowledge the support of James Kravitz and Peter Loewenhardt with the statistical analysis portion of this project and San Jose State University advisors Kevin Corker and Ilana Westerman for their feedback on this project. Appreciation needs to be mentioned for the encouragement supplied by friends Sherry Louie, Judi Morton, Lauren Purcell, Hina Saiya, Coleen Sarin, and Debbie Smith, as well as the members of Pleasanton's Valley Community Church. Special recognition needs to be mentioned of the patience and understanding of the author's husband, Peter, and children, William and Rachael, without whom completion of this manuscript would not have been possible.

TABLE OF CONTENTS

INTRODUCTION.....	1
METHOD.....	4
Participants.....	4
Variables.....	4
Methodology.....	5
RESULTS.....	7
DISCUSSION.....	16
CONCLUSION.....	19
Recommendations.....	19
REFERENCES.....	21
APPENDICES.....	23
Appendix A – Closure devices.....	23
Appendix B – Agreement to participate in research.....	24
Appendix C – Pre-task survey.....	26
Appendix D – Testing script.....	28
Appendix E – Task instructions.....	31
Appendix F – Post-task survey.....	32
Appendix G – Testing layout.....	36
Appendix H – Photos of hands with RA.....	37
Appendix I – RA location indicator instrument.....	38

LIST OF TABLES

Table 1 – Results for opening time on task for bag closure devices.....	7
Table 2 – Results for closing time on task for bag closure devices.....	8
Table 3 – Likert scale survey results for perceived ease of use for opening and closing.....	13
Table 4 – Prior use of the closure devices by the participants.....	15

LIST OF FIGURES

Figure 1 – Opening and closing medians of time on task for closure devices with standard error bars indicated.....	9
Figure 2 – Participants opening and closing time results for the twist tie closure device.....	10
Figure 3 – Participants opening and closing time results for the Twixit™ closure device.....	11
Figure 4 – Participants opening and closing time results for the Kwik Lok™ closure device.....	11
Figure 5 – Participants opening and closing time results for the autoclave closure device.....	12
Figure 6 – Likert scale preference rating means for closure devices.....	13
Figure 1A – The twist tie closure device used in this study.....	23
Figure 2A – The Twixit™ closure device used in this study.....	23
Figure 3A – The Kwik Lok™ closure device used in this study.....	23
Figure 4A – The autoclave closure device used in this study.....	23
Figure 1G – Layout for the video recording viewing angle in relationship to the participant and the four bread bags with closure devices.....	36
Figure 1H – Images of hands with a moderate stage of RA.....	37
Figure 1I – Instrument used to obtain data from participants regarding location of RA.....	38

INTRODUCTION

The American College of Rheumatology defines Rheumatoid Arthritis (RA) as “an autoimmune disease in which certain cells of the immune system malfunction and attack healthy joints...(and) is a chronic disease that causes pain, stiffness, swelling and limitation in the motion and function of multiple joints” (ACR, 2006). According to the National Center for Chronic Disease Prevention and Health Promotion there are 43 million American adults in 2002 with doctor-diagnosed arthritis and in addition 23 million people report chronic joint symptoms although they were not clinically diagnosed to specifically have arthritis (CDCP, 2005). Arthritis affects people of all ages and nearly two-thirds of individuals with arthritis are under 65 years old. In California there are 28.01% of adults with doctor-diagnosed arthritis many of whom are suffering from RA (Arthritis Foundation, 2005).

For individuals with RA experiencing pain, stiffness, and swelling the limitations in range of motion and function of the joints in the hand can affect the activities of daily living (ADL) causing difficulty in performing tasks in the kitchen such as opening bottles or bread bags. Although a significant amount of research has been done on package opening issues (Hoske, 2005; Peters, 1994; Saha & Shehab, 2005), strength (Bohannon, 2002) and the functional limitations of ADL (Rogers et al., 1998; Kauppi et al., 2004) with the aging population it was undetermined as to what extent the issues associated with the aging applied in the context of the present study. This study evaluated various methods for opening and resealing bread bags in the interest of accessibility for people with functional limitations due to the effects of RA. These include fatigue, swelling, and

inflammation that prevents ease of use in object manipulation (Riemsma et al., 1998; Minaker, 1990; Barden et al., 1995). Research into patient education and self-management programs (Osborne et al., 2004; Veitene & Tamulaitiene, 2005; Hammond et al., 2004) have shown that it is important for individuals with RA to be able to perform ADL in order to empower people and improve their quality of life.

Bread bag closures are manufactured with the intent to seal the sliced bread and label (date) it for freshness purposes (Hoske, 2005; Kwik Lok, 2005). Manufacturers that produce these bread bag clips claim that their closure devices are easy to use (Kwik Lok, 2005). Individuals with RA may have difficulty in object manipulation since their hands may be deformed causing a regular grip to not be possible (Lougheed, 1990). Individuals require that the package is accessible enough that they can open it but not so accessible that the contents can be tampered with prior to reaching their kitchen (Johnson, 2001; Berne, 2002). Also, sealing the package after the package is opened is an important consideration for the user to ensure the freshness of the food inside. Alternatives to closing the bag include discarding the clip and tucking the plastic under the package, resealing with a spring loaded clip, or transferring the bread to a sealed container.

Autoclaves are devices that enable the heating of aqueous solutions up to temperatures above the boiling point of water (Wikipedia, 2005). They are currently used in the medical laboratory industry and the closure devices for the autoclave plastic bag are used to seal the sterilized instrument from the contaminants outside the autoclave and therefore must seal the contents securely. The shape of the closure is different than those used in the baking industry due to the extended plastic tabs that allow single handed use of the autoclave closure device by the medical laboratory operator. Using this type of

bag closure in the bread bag closure industry may present an alternative for greater accessibility for individuals with functional difficulties due to RA. For this reason it was important to study the use of this autoclave closure device within the home kitchen environment to determine if there was a difference in the ease of use between the closure devices already used in the baking industry and the autoclave closure device.

The purpose of this research was to analyze four different plastic bag closure devices to determine if there was a difference in their ease of use for individuals with RA between closures currently on the market and an autoclave bag closure currently in use in medical laboratories. The goal of this study was to identify issues with each type of closure device including length of time, intuitiveness and difficulties with opening and closing and to determine recommendations for the bread bag closure industry so that an impact can be made on the lives of the individuals of all ages that are suffering with RA.

METHOD

Participants

Participants needed for this study were individuals affected by RA. Since age is not a factor in the disease it was not a consideration in the study. There were 13 participants recruited. Each participant was over 18 years of age, male or female and diagnosed with RA in their hands. Health of the individual was determined by the classification of RA designated by The American Rheumatism Association (Arnett et al., 1988) and as described by Mochan (2005). It was important to study this sample group due to the limitations that the disease effects on ADL to discover the usability issues surrounding the bread bag closure devices. Participants were recruited from the general public using fliers posted in local coffee shops, businesses and senior centers in Pleasanton, California.

Variables

The independent variable was the type of bag closure. The four packaging closures evaluated are shown in Appendix A and include a twist tie, closures Twixit™ and Kwik Lok,™ and an autoclave bag closure device. These packaging closures devices were identified from a search of plastic bag closure methods. The closure Twixit™ was selected due to its designation by the distributor for its ease of use (Active Forever, 2005). The Kwik Loc™ closure (Kwik Lok, 2005) and the twist-tie were selected for their current usage within the baking industry and the autoclave closure (LSS, 2005) was chosen due to its usage in a much more rigorously industrial setting than the household kitchen. Dependent variables in this study were the time on task for opening and closing

the bread bags and the preference rating using a Likert scale for each of the four bread bag closure devices.

Methodology

Participants were asked to sign a consent form (Appendix B) to show their willful intent to participate in this study. They were then asked to complete a pre-task survey (Appendix C) to determine familiarity with the bag closure devices. Following a testing script (Appendix D) the researcher then asked participants to perform the same task of opening the bag, removing a slice of bread and closing the bag with the same closure device (Appendix E). The task was performed on each of the four bread bags only once. The order in which the bags were placed in front of the participant was randomized to ensure testing randomization.

Once the participant completed all four tasks they were asked to complete a post-task survey (Appendix F) to determine their perceived ease of use of the four closure devices and their previous experiences using bread bag closures. If any of the participants had difficulty in filling out the survey the researcher administered it verbally to the participant and recorded the answers. Using a video camera the four tasks were taped from a three quarter viewing angle that showed the participant and the table with the four loaves of bread (Appendix G). Data from the video camera was transferred to a computer for measurement of time on task. A digital photograph of the participant's hand was taken to determine severity of RA (Appendix H). Each participant was also asked to indicate the location of their arthritis using a marker on a piece of paper with a drawing of a pair of hands (Appendix I).

The videotaped clips on the computer were used to review each participant's actions on the four tasks. Length of time was taken from as soon as the participant touched the closure on the bagged loaf of sliced bread until the task was complete and the participant has removed all hands from the closure device. The data from each participant for each bread bag closure was compiled and statistical analyzed as to the median length of time for each closure device.

RESULTS

This study was a single factor within-subjects analysis of a repeated measures design with the type of closure device as the within subjects effect. Analysis of the issues of bread bag closure devices took place once all the video taped sessions were completed. An Excel spreadsheet was used to record the results and the mean, median, range, standard deviation and standard error of time on task for the four closure devices was determined (Table 1). An ANOVA was also conducted using SPSS software to determine if there was a significant difference between the closure devices. Since the p -value was .33 for the opening and .69 for the closing tasks there was no statistically significant difference between the bread bag closure devices for time on task.

Table 1.

Results for Opening Time on Task for Bag Closure Devices (N = 13; df = 3)

Closure Type	Mean	Median	Range	Standard Deviation	Std Error
Twist tie	8.6	5	34	9.2	2.54
Twixit™	5.2	3	26	7.1	1.96
Kwik Lok™	8.5	5	48	12.7	3.51
Autoclave	12.4	9	29	9.4	2.60

$F(3,12) = 1.17. p = .33.$

Table 2.

Results for Closing Time on Task for Bag Closure Devices (N = 13; df = 3)

Closure Type	Mean	Median	Range	Standard Deviation	Std Error
Twist tie	8.6	8	20	5.1	1.43
Twixit™	10.9	7	48	12.8	3.54
Kwik Lok™	11.2	9	33	9.7	2.70
Autoclave	13.2	9	34	9.7	2.68

$F(3,12) = .49$. $p = .69$

Several participants had more extreme times than the others and their data would be considered outliers with the raw scores. However, it was important to include their scores in the analysis as they represent a real part of the sample population. Due to the fact that there was a wide range of values for the reported times on task for opening and closing it was determined that the median score be evaluated rather than the mean which would have placed the values of the closure devices closer to the value of the participant with the greatest time.

Referring to the data in Table 1 the data for opening medians ranged from 3 seconds for the Twixit™ to 9 seconds for autoclave closure device. The data for the closing medians in Table 2 ranged from 7 seconds for the Twixit™ closure to 9 seconds for both the Kwik Lok™ and the autoclave closure devices. In reviewing Figure 1 the

opening median times are equal to or greater than the median closing times for the four closure devices. Only the autoclave closure device had the same median value for both opening and closing indicating that the participants took a consistent length of time to open and close this device.

Figure 1. Opening and closing medians of time on task for closure devices with standard error bars indicated.

Due to the wide standard error bars in Figure 1 it is necessary to present the results for each of the four closure devices. The time on task results for each of the four closures are represented in Figure 2 (twist tie), Figure 3 (Twixit™), Figure 4 (Kwik Lok™) and Figure 5 (autoclave). Variations in the data are shown by participants for

some of the closure devices for either opening, closing or both. However, participants show a consistently higher level of time on task for the autoclave closure device as shown in the results represented in Figure 5.

Figure 2. Participants opening and closing time results for the twist tie closure device.

Figure 3. Participants opening and closing time results for the Twixit™ closure device.

Figure 4. Participants opening and closing time results for the Kwik Lok™ closure.

Figure 5. Participants opening and closing time results for the autoclave closure device.

The ease of use level of the bag closure devices was determined by the mean value each device was calculated to obtain using a five point Likert scale of perceived ease of use taken during the post-task survey (Appendix F). Results of the data are shown in Table 3 and Figure 6.

Table 3.

Likert Scale Survey Results for Perceived Ease of Use for Opening and Closing

Closure Type	Opening	Closing
Twist tie	1.8	1.6
Twixit™	1.8	1.8
Kwik Lok™	3.0	3.4
Autoclave	3.2	3.0

Figure 6. Likert scale preference rating means for closure devices.

Preference for the closure devices was taken after all the four tasks had been performed so that an adequate evaluation of the closure device could be determined. Using a five point Likert scale each participant rated the ease of use of each closure device from 1 (easy) to 5 (difficult). A mean score was used for the analysis in which the results can be seen in Figure 2. The perceived ease of use from the Likert scale showed that the opening and closing tasks for each closure device were rated by the participants in a very similar manner. Preference against opening and closing the bread bag with both the Kwik Lok™ and autoclave closure devices did however show that the participants perceived difficulties with those closure methods. The mean for the Twist tie and the Twixit™ closure devices were rated as moderately easy to open and close indicating a preference for those closures.

During the pre-task survey (Appendix C) the participants were asked to state their familiarity with the closure devices in order to determine prior knowledge of the device usage. Table 4 indicates the results from the survey showing that the twist tie and the Kwik Lok™ closure devices were familiar to the participants and the Twixit™ and the autoclave closure were both unfamiliar devices that had not been seen nor used before.

Table 4.

Prior Use of the Closure Devices by the Participants

Closure Type	Prior Usage
Twist tie	Use Frequently
Twixit™	Never Used
Kwik Lok™	Use Frequently
Autoclave	Never Used

The digital photos (Appendix H) were analyzed to determine RA severity and compliance with the RA guidelines of Arnett et al., (1988). As well, the location indicator sheet (Appendix I) where the participant marked the locations of their arthritis was used to further determine RA severity. All participants indicated at least four locations where arthritis was currently affecting the joints causing swelling, pain, stiffness and discomfort on a regular basis. Participants also had visual evidence of deformation at the joint causing the finger not to align straight but deviate from the joint in either an ulnar or radial manner. The participants in this study did not all have the same locations noted for their arthritis although they all suffered from RA in their hands.

DISCUSSION

After the data accumulated during the video taped sessions and from the surveys was completed the results was reviewed and analyzed. The results of both the preference and time on task is interesting to note as the perceived ease of use for the twist tie and the Twixit™ do not relate to the time on task for closing the bags using those devices. As indicated by the mean preference and median time on task participants were more inclined to state a preference for those devices for closing even though the actual time it took to close the bag was similar to the other two closure devices of the Kwik Lok™ and the autoclave closure. Also, the perception of the Kwik Lok™ closure device as shown in Figure 6 was perceived as being much more difficult to open than was indicated by the time on task median score shown in Figure 1. It is possible that the participants came to the study with a preconceived notion as to the difficulty of this closure device and that their preference was based more on previous issues with the device than was actually experienced during this research study.

Results in Table 4 show that the participants interviewed for this study were familiar with both the Kwik Lok™ and the twist tie but had not seen the Twixit™ or the autoclave closure devices prior to this research study. Due to the unfamiliarity of the participants with the autoclave closure device it is important to note that the time on task for opening and closing took the same or longer than the other closure devices. As well, the perceived ease of use rating for this closure device was in the moderate to difficult range. Since the device had not been seen before it is possible that the participants needed extra time to become familiar with the device before testing it against more familiar closure devices. However, if this was a valid indication of ease of use and time

on task then the Twixit™ device may have recorded similar results. Referring to Figure 1 the Twixit™ median time of 3 seconds for opening was the least of all the closure devices. One explanation for this could be nature of the device being similar to a spring-loaded clip that releases to the touch of the participant. The median time required to close this device was double that of the median opening time perhaps due to the spring clip nature of the device and the unfamiliarity of the participant to the closure method. The Twixit™ closure device requires a pinching grip to close and the plastic bag needs to be loosely gathered inside the flat plastic closure device to allow for the closure to take place with minimal effort. If the plastic is twisted or gathered too tightly then the user is required to exert extra pressure on the closure device to seal the bag. This may be difficult for individuals with RA due to the reduction of strength that is sometimes experienced as symptoms of RA.

Comments made by the participants regarding the four bread bag closures during the post-task survey (Appendix F) include references to difficulties with not only strength but also for the fine motor functions required for manipulating small objects. Recorded comments include “the twist tie is difficult to turn and my finger stays there,” the “(Kwik Lok™) too difficult to grasp to open and more so to close,” and “(Kwik Lok™ takes the most time to put on and take off even though I am familiar with it.” Comments regarding the closure of the bag closure devices included “(Autoclave) trouble manipulating the tips together for the final latch,” “because its too much trouble I usually take off the bread closure, twist it and tuck it underneath,” and “(Twixit™) harder to grip...hands don’t do well on small things.” A consistent frustration is shown in these comments regarding the

manipulation of small objects and as well the strength required to either open or close the devices.

The uncertainty as to the direction of the twist tie for opening is continued in the comments by one participant regarding "knowing which way to go with the twist tie...maybe seeing is the problem...I felt the way through the process." This connection with sight is an issue for greater discussion than is possible during the reporting of this research but it does raise the awareness that closure devices need not only address the issue of strength and manipulation but also intuitiveness for use under circumstances of poor vision or low lighting.

It is important to note that the participants in this research study were not required to provide medical data stating doctor-diagnosed RA. As the only indication of RA was from the participant's noting locations on the RA indicator form (Appendix I) and from the visuals provided by the digital photos it should be clarified that the participant sample may not be a true representation of the intended sample set. A participant could possibly have arthritis but not RA. Regardless of the self reporting incidents of the participants the issues remain valid for the sample of individuals with RA since symptoms of arthritis result in similar restraints of RA including swelling, stiffness and loss of strength.

CONCLUSION

The purpose of this research was to analyze four different plastic bag closure devices to determine if there was a difference in their ease of use for individuals with RA between closures currently on the market and an autoclave bag closure currently in use in medical laboratories. Four bag closure devices were under investigation for this research study and an analysis of the participants as users of these closure devices was mentioned in the discussion section. It was thought that using an autoclave closure device may present an alternative for greater accessibility for individuals with functional difficulties due to RA. Due to the unfamiliarity of the participants with the autoclave closure device the researcher could not conclude that it would be a preferred alternative for the bread bag closure industry within the home kitchen environment.

However, other issues regarding the currently marketed bread bag closure devices were determined to cause frustration for individuals with RA including small object manipulation and strength required to open or close the devices. Further study is need to determine the parameters required by this group of individuals to reveal the maximum pressures of pinch grip force and adequate size for bread bag closure devices.

Recommendations

It is therefore recommended that designs of bread bag closure devices be made in accordance with the needs of individuals with RA including ease of use with minimal strength and intuitiveness of the opening and closing direction. Materials used in the construction of the closure device are advised to be flexible enough to manipulate easily and yet sturdy and large enough to be grasped by individuals with limited grasping abilities and possibly vision impairment.

As mentioned in the introduction section users are currently using their own closure devices or none at all after the initial opening of the bags to allow a greater ease of use with their limited abilities. It is preferable that the closure device be useable after the initial opening of the bread bag for all populations regardless of age or skill required.

The environmental impact of the closure device also needs to be considered as many individuals discard the device into the garbage along with the used plastic bag. Alternatives should be investigated for other closure methods that do not require an extra piece of plastic but is integrated into the bag itself.

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Appendix A

Closure Devices

Figure 1A. The twist tie closure device used in this study.

Figure 2A. The Twixit™ closure device used in this study.

Figure 3A. The Kwik Lok™ closure device used in this study.

Figure 4A. The autoclave closure device used in this study.

Appendix B

Agreement to Participate in Research

Responsible Investigator: Ruth Loewenhardt

Title of Protocol: Analysis of bread bag closures for individuals with Rheumatoid Arthritis

1. You have been asked to participate in a research study investigating four bread bag closure devices for their ease of use.
2. You will be asked to perform the same task of opening a plastic bag, removing a slice of bread and re-closing the bag with the same closure device. This task will be done four times on four different bread bag closures. This study will take place in Pleasanton, California during 2006.
3. There are no foreseeable risks involved in performing the tasks that are greater than those encountered in everyday life. However, should you feel discomfort in opening or resealing the bread bags with the closure devices you may terminate the session.
4. There are no direct benefits of this research on the participants although this research will be used to expand the knowledge base of information regarding issues experienced by individuals with Rheumatoid Arthritis.
5. Although the results of this study may be published, no information that could identify you will be included.
6. Compensation for participation in the study is a \$5 Starbucks gift card.
7. Questions about this research may be addressed to Ruth Loewenhardt, (925) 462-8710. Complaints about the research may be presented to Lou Freund, Chair, Department of Industrial Systems and Engineering, (408) 924-3890. Questions about research subjects' rights, or research-related injury may be presented to Pamela Stacks, Ph.D., Associate Vice President, Graduate Studies and Research, at (408) 924-7029.
8. No service of any kind, to which you are otherwise entitled, will be lost or jeopardized if you choose to "not participate" in the study.
9. Your consent is being given voluntarily. You may refuse to participate in the entire study or in any part of the study. If you decide to participate in the study, you are free to withdraw at any time without any negative effect on your relations with San Jose State University or with any other participating institutions or agencies.

10. At the time that you sign this consent form, you will receive a copy of it for your records, signed and dated by the investigator.

* The signature of a subject on this document indicates agreement to participate in the study.

* The signature of a researcher on this document indicates agreement to include the above named subject in the research and attestation that the subject has been fully informed of his or her rights.

Signature

Date

Investigator's Signature

Date

Appendix C

Pre-Task Survey

1) Are you familiar with any of these bread bag closures?

Closure #1		☐ Never seen
		☐ Seen but never used
		☐ Used once
		☐ Frequently use

Closure #2		☐ Never seen
		☐ Seen but never used
		☐ Used once
		☐ Frequently use

Closure #3		☐ Never seen
		☐ Seen but never used
		☐ Used once
		☐ Frequently use

Closure #4		☐ Never seen
		☐ Seen but never used
		☐ Used once
		☐ Frequently use

2) Do you or anyone in your household purchase sliced bread from a store?

YES ☐ NO ☐

3) Do you prepare the sliced bread that is purchased from the store?

YES ☐ NO ☐

If you answered "NO," who does prepare the sliced bread in your household?

(please check all that apply)

- ☐ Spouse
- ☐ Sibling
- ☐ Children
- ☐ Parents
- ☐ Caregiver
- ☐ Other _____

4) Do you or anyone in your household purchase other items than sliced bread that use plastic closures to seal plastic bags?

YES ☐ NO ☐

If you answered "YES," what items are purchased? (please check all that apply)

- ☐ Buns or bagels
- ☐ Fresh vegetables
- ☐ Candies / sweets
- ☐ Bulk bin items
- ☐ Other _____

Thank you.

Appendix D

Testing Script

Introduction:

Welcome.

Today we are trying to get your input on different bread bag closures. If at any time you feel unable to continue please notify the tester and the session will end.

Please review the form regarding participation in this test and then sign it if you agree with the statements.

Please fill out the survey so that we can have a better understanding of your background. None of the information will be used for any purpose other than in the analysis for this test. If you need assistance please let me know.

The session today will be video taped and recorded for future analysis. Once the session starts it is important for you to focus on the task at hand and complete it to the best of your ability. Should you be unable to complete a task please inform the tester that you are finished with the task and we will move on to the next task.

The tester does not have any affiliation with the products. It is therefore important to note that the information you give will be considered data and used in the analysis. There is no right or wrong way of doing the tasks. If a task can not be completed that is also data.

Testing:

Please adjust your chair so that your arms are able to reach the counter without straining.

In front of you there are four loaves of bread on the counter sealed by four different bag closures and labeled with numbers #1 through #4.

You may move the bread loaves closer to you while working on the task but remember to return them to the original marked spot between tasks.

Here are your instructions. (Hand instructions on piece of paper to participant.) So that there is no confusion I'll explain verbally the tasks before you begin.

The four tasks are identical except for the bag closure devices.

Starting with bread loaf #1.

1) Take off the bag clip.

- 2) Remove a slice of bread and place it on the plate.
 - 3) Reseal the bag using the same bread bag clip
 - 4) Place the bag back on the outlined area it was taken from.
- Next, continue with the other bread loaves #2 through to #4.

You may begin when you are ready.

Conclusion:

Participant #_____

Now I have some questions for you regarding your impressions of the closures.
Remember there are no right or wrong answers.

- 1- Which of the four bread bags did you find the most difficult to open?
1_____ 2_____ 3_____ 4_____
 - 2- Why do you think it's the most difficult to open?
Reason`_____
 - 3- Which of the four bread bags did you find the most difficult to close?
1_____ 2_____ 3_____ 4_____
 - 4- Why do you think it's the most difficult to close?
Reason_____
 - 5- Were you familiar with all of these bread bag closures?
Y – continue to question #6
N – If not then which had you not seen before:
1_____ 2_____ 3_____ 4_____
 - 6- Which style of closure does your sliced bread usually have?
1_____ 2_____ 3_____ 4_____ None of these_____ (list)
 - 7- Can you think of anything else that may assist with the analysis of bread bag closures?

Y – Explanation:_____
- N – continue.

Thank you for your input with the tasks today. You did a great job and have really given us some valuable data to analyze.

Please fill in this post-task survey so we can gather even more data about your experience.

A couple of final items:

I would like to take a digital photo of your hands. Please place your hands on this paper.

Could you please indicate on this sheet where you are currently experiencing your arthritis.

Thank you so much for your time and assistance with my research. Our session is finished and you are free to leave.

Appendix E

Task Instructions

Task #1

Start with bread loaf #1.

- 1) Take off the bag clip.
- 2) Remove a slice of bread and place it on the plate.
- 3) Reseal the bag using the same bread bag clip.
- 4) Place the bag back on the outlined area.

Task #2

Continue with bread loaf #2

- 1) Take off the bag clip.
- 2) Remove a slice of bread and place it on the plate.
- 3) Reseal the bag using the same bread bag clip.
- 4) Place the bag back on the outlined area.

Task #3

Continue with bread loaf #3:

- 1) Take off the bag clip.
- 2) Remove a slice of bread and place it on the plate.
- 3) Reseal the bag using the same bread bag clip.
- 4) Place the bag back on the outlined area.

Task #4

Continue with bread loaf #4:

- 1) Take off the bag clip.
- 2) Remove a slice of bread and place it on the plate.
- 3) Reseal the bag using the same bread bag clip.
- 4) Place the bag back on the outlined area.

Please inform the assistant when you are done. Thank you.

Appendix F

Post-Task Survey

1) Thinking about your experience with **opening** the bread bags how would you rate the ease of use for the closures?

(On a scale of 1 to 5 where 5 is the most difficult please rate the following)

Closure #1		☐	☐	☐	☐	☐		
		Easy	1	2	3	4	5	Difficult
Closure #2		☐	☐	☐	☐	☐		
		Easy	1	2	3	4	5	Difficult
Closure #3		☐	☐	☐	☐	☐		
		Easy	1	2	3	4	5	Difficult
Closure #4		☐	☐	☐	☐	☐		
		Easy	1	2	3	4	5	Difficult

2) If you rated any clip a 3, 4 or 5 what was the reason for your rating?

3) Thinking about your experience with **closing** the bread bags how would you rate the ease of use for the closures?

(On a scale of 1 to 5 where 5 is the most difficult please rate the following)

Closure #1		☐	☐	☐	☐	☐		
		Easy	1	2	3	4	5	Difficult
Closure #2		☐	☐	☐	☐	☐		
		Easy	1	2	3	4	5	Difficult
Closure #3		☐	☐	☐	☐	☐		
		Easy	1	2	3	4	5	Difficult
Closure #4		☐	☐	☐	☐	☐		
		Easy	1	2	3	4	5	Difficult

4) If you rated any clip a 3, 4 or 5 what was the reason for your rating?

5) Have you ever had issues **opening** bread bags before?

YES ☐ NO ☐ (continue to question 6)

If you answered "YES" what was the reason? _____

How did you eventually get the bag opened? (check all that apply)

- ☐ Used scissors
- ☐ Used a knife
- ☐ Asked someone else for assistance
- ☐ Other _____

6) Have you ever had issues **closing** bread bags before?

YES ☐ NO ☐ (continue to question 7)

If you answered "YES" what was the reason? _____

How did you eventually get the bag closed? (check all that apply)

- ☐ Used a different clip
- ☐ Twisted plastic and placed it under the sealed loaf
- ☐ Asked someone else for assistance
- ☐ Other _____

7) Is there is anything else you would like to mention regarding opening or closing bread bags please state: _____

8) Do you know of others who have had issues with bread bag closures?

YES ☐ NO ☐

If you answered "YES" what was the issue and how was it resolved? _____

Thank you for your assistance.

Appendix G

Testing Layout

Figure 1G. Layout for the video recording viewing angle in relationship to the participant and the four bread bags with closure devices.

Appendix H

RA Hands

Figure 1H. Images of hands with a moderate stage of RA.

Appendix I

RA Location Indication Instrument

Figure 11. Instrument used to obtain data from participants regarding location of RA.