

(RESEARCH ARTICLE)



Stretch marks: Efficacy of herbal remedies (Cocoa and shea butter, vitamin E, calendula oils) and student survey

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Abstract

The study sought to assess the efficacy of herbal remedies for treating stretch marks by conducting a comprehensive literature review and administering a survey to gauge the knowledge and opinions of pharmacy students. This initiative aimed to bridge existing gaps in understanding and perceptions surrounding stretch marks and available treatment modalities. The survey was conducted among 40 first-year pharmacy students and comprised two sets of questions and demographic data: knowledge-based and opinion-based. Descriptive statistical analysis and Chi-square tests were performed using SPSS software to determine statistical significance. Among the participants, 75% were female with 90% of them within the age range of 18 to 30 years. The knowledge-based survey revealed a solid understanding of aspects related to stretch marks among participants. Almost all (97%) of respondents correctly identified that stretch marks usually appear on the skin due to rapid weight changes. Eighty percent correctly acknowledged stretch marks as a type of scar, while two-thirds answered affirmatively regarding their potential to cause irritation and itching. Misconceptions were identified, such as respondents incorrectly believing that stretch marks are exclusively formed through pregnancy. In the opinion-based survey, participants expressed varying viewpoints on stretch marks and herbal treatments. Statistical analysis revealed several significant correlations between demographic factors and participants' understanding of stretch marks. The survey findings provide valuable insights into stretch mark management and students' perceptions of herbal remedies. Overall, the study underscores the significance of further research and targeted educational initiatives in dermatological conditions like stretch marks.

Keywords: Stretch marks; Striae distensae; Herbs; Knowledge; Opinions; Perceptions

1 Introduction

The American Academy of Dermatology Association (AAD) describes a stretch mark or striae distensae, as the following, “a type of scar that develops when our skin stretches or shrinks quickly. The abrupt change causes the collagen and elastin, which support our skin, to rupture” [1]. Regarding its mechanism, stretch marks are thought to be caused by elastases released from mast cells and macrophage activity, followed by a reorganization of collagen and fibrillin [2]. Stretch marks can arise from various causes such as growth spurts, pregnancy, rapid weight loss and weight gain, or rapid muscle growth [1].

Other triggers of stretch marks are fluctuating hormone levels, chronic topical corticosteroid use, family history, or certain autoimmune conditions [1]. The prevalence of striae distensae is relatively common, with up to 88% of pregnant women developing them, and similar rates occur in puberty [2]. Although not physically harmful, stretch marks can cause emotional or psychological distress and insecurities in those who develop them, leading to a decreased quality of life (QOL) [3]. AAD states topical treatments such as tretinoin, retinol, and hyaluronic acid have proven to be effective in making early stretch marks less noticeable [1]. Procedures performed by dermatologists to make stretch marks less

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noticeable include chemical peels, laser therapy, microdermabrasion, radiofrequency, and ultrasound [1]. Though all the above-listed treatments are advantageous in reducing stretch mark appearance, none of them have been proven to eradicate stretch marks. However, it is important to emphasize that topical treatments such as tretinoin should not be used in pregnant or breastfeeding females due to their teratogenic risk, warranting other treatment options in this population [4].

Herbal treatments have been used for centuries to treat different ailments, and their use has been extensively studied in various clinical trials to determine their effectiveness in reducing stretch mark severity, especially in pregnant women. The following study will explore the effectiveness of herbals such as cocoa butter, shea butter, vitamin E oil, and calendula oil in stretch mark treatment. Additionally, a survey was conducted to assess pharmacy students' perceptions and knowledge regarding herbal treatments and their effectiveness in stretchmark reduction and improvement, and how they compare to the literature currently available regarding others' perceptions and opinions of herbals.

2 Review of Herbs for Stretch Marks

- **Cocoa Butter:** A literature search was performed to investigate if herbal treatments are effective in the management of stretch marks. There was a focus on cocoa butter, shea butter, vitamin E oil, and calendula oil. Cocoa butter comes from the beans of the cacao plant and has been proven to provide benefits in moisturizing skin, relieving eczema, as well as protecting against premature aging [5]. Hague and Bayat performed a systematic review evaluating treatments in the management of striae distensae (SD), in which cocoa butter, among other herbal supplements, was discussed [6]. Their report included that cocoa butter was investigated for its effectiveness in preventing SD, but the two trials failed to prove any significant benefits from its use [6]. Ud-Din, et al., concluded similar results to Hague and Bayat when assessing if cocoa butter can be used as a prophylactic treatment in SD when compared to a placebo [6,7]
- **Shea Butter:** Shea butter is a creamy fat solid at room temperature, and it is found in nuts growing on shea trees in African countries [8]. Shea butter is a moisturizer similar to cocoa butter in that it contains fatty acids, and vitamin E. However, unlike cocoa butter, it also has vitamin A [8]. Lin et al., conducted a study and concluded shea butter showed benefits in anti-inflammatory and antioxidant effects when applied topically to the skin but failed to show advantages in wound healing, skin cancer, and skin aging [9].
- **Vitamin E:** Vitamin E is an antioxidant, that can help to protect cells, as well as provide moisture to the skin [10]. It has been hypothesized that olive oil could be effective in preventing striae gravidarum, due to its high vitamin E content, but trials did not prove its use to be a beneficial [6]. Additionally, another trial compared the effects of almond oil to olive oil in preventing stretch marks in pregnancy and concluded neither was effective in reducing the severity [6].
- **Calendula Oils:** Calendula oil is extracted from the flower of the marigold plant, with major constituents of the leaves consisting of lutein and beta-carotene [11]. Preclinical trials have shown calendula oil to have demonstrated antioxidant, antimicrobial, and anti-inflammatory effects [11]. Akhtar et al., performed a study comparing a calendula formulation to a placebo, to assess age-related changes in skin, skin elasticity, skin fatigue, and skin hydration over a series of eight weeks [12]. The study concluded that those who used the calendula formula demonstrated significant improvements in skin hydration and firmness [12].
- **Review of Opinions and Perceptions:** An herbal literature review was performed to assess others' opinions on their use of treating and managing stretch marks. Although there is a scarcity of published literature evaluating healthcare professionals' perceptions regarding herbals used for stretchmarks, a survey of the knowledge, attitudes, and practices of physicians towards herbal remedies in Iran was conducted. The study distributed 650 questionnaires and had a response rate of 21.84%, with the most common reason for refusal of the survey being cited as having no time for the survey (55.5%) and overall disbelief in the use of herbal medicines (31.1%) [13]. It was noted that the overall knowledge of herbals was low among physicians, with an average score of 6.47 out of 25 points, although there was a positive view of herbals indicated by a score of 27.8 out of 40 total points [13]. Moreover, Brennan et al, surveyed 753 pregnant women at 36 weeks gestation or more, through an online survey, and both descriptive and inferential statistical analyses were performed to analyze the responses [14]. Seventy-eight percent of respondents stated they used a product to prevent or reduce stretch marks, with the majority (61%) indicating they used Bio-oil [14].

In a cross-sectional study performed by Karhade et al., the impact of stretch marks developing during pregnancy, and women's QOL were assessed [3]. The study included responses from 116 survey participants who were asked to report whether the permanency of stretch marks was a top physical concern, and 75% agreed it was. Around 70% of participants rated their stretch mark lesions as either prominent or moderate in severity, and almost 40% reported feeling embarrassment and self-consciousness regarding their stretch marks [3].

Another study performed by Zhu et al., investigated consumer preference for products for the prevention and treatment of stretchmarks [15]. The study focused on products from the online retailer, Amazon and focused on both stretch mark-specific and non-stretch mark-specific products with 100 reviews or more, and at least a rating of 4 or higher. 63.6% of the 184 products included in the review were determined to be stretch mark specific and the most common ingredient was vitamin E [15]. Other ingredients that had the highest prevalence among products for stretch marks included shea butter, cocoa butter, Centella asiatica, and olive oil [15].

Literature Gap, Study Objective, and Impact: This study aimed to achieve two primary objectives. Firstly, it sought to evaluate the existing literature concerning the efficacy of herbal treatments for stretch marks. Secondly, it aimed to assess the knowledge and opinions of pharmacy students regarding stretch marks and the utilization of herbal remedies as a treatment option. Given the limited availability of literature on healthcare professionals' awareness and attitudes toward stretch marks and the use of herbal treatments, this investigation was deemed necessary. Stretch marks affect a wide range of individuals and often have a significant emotional impact. While stretch marks are typically permanent, treatment options exist to mitigate their visibility and alleviate associated itching, highlighting the importance of exploring herbal treatment alternatives [1]. Retail pharmacists are front-line healthcare workers and should be aware of patients' perceptions of stretchmarks and treatments, to make informed recommendations if placed in these situations.

3 Material and Methods

This survey was conducted as part of the Drug Information course, which is a mandatory 2-credit-hour class for first-year professional pharmacy students at Howard University College of Pharmacy. In this course, students received instruction on research methodology and survey administration. Students were assigned a topic and tasked with crafting an introduction and developing two sets of survey questions. The first set comprised 5 knowledge-based questions, while the second set contained 5 opinion-based questions. These questions were incorporated into an online survey, and students were invited to participate in answering them. Descriptive statistical data analysis was conducted using SPSS software version 29.0, and responses were summarized using data frequencies. Chi-square tests and symmetric measures (interval by interval) were performed to determine statistical significance based on the Pearson R asymptotic standard error when comparing student responses to various demographical, educational, and work-related backgrounds.

4 Results

The results report the findings collected from 40 first-year pharmacy students regarding their knowledge and opinions of stretch marks and the use of herbals as treatment. Demographic data is displayed in Table 1, showing the majority of participants were female in gender and aged between 18 to 30 years old. Over half (56%) of participants were from the District of Columbia, Maryland, or Virginia (DMV) area, with the remaining reporting being from other states.

Table 1 Demographic data of the participants (n = 40)

Demographic Characteristics	Breakdown of Demographic Characteristics	n (%)
Gender	Male	10 (25%)
	Female	30 (75%)
Age (Years)	18 to 30	36 (90%)
	30 to >40	4 (10%)
State you have lived before coming to Howard Pharmacy Program.	District of Columbia/Maryland/Virginia	22 (56.4%)
	Other states	17 (43.6%)

Table 2 assesses the work experiences and educational backgrounds of the survey participants. Two-thirds of students stated they had over 3 years of work experience, with half reporting it was pharmacy-related. Additionally, over 80% of students stated they received at least a bachelor's degree or higher level of education before attending the College of Pharmacy.

Table 2 Work and educational background of the survey participants (n = 40)

Survey Question	Answers	n (%)
How many years have you had a paying job before joining the Pharmacy program at Howard?	Never worked, or 2 or less years of work experience	14 (35%)
	At least 3 years of work experience	26 (65%)
What kind of work have had?	Pharmacy related	20 (52.6%)
	Non-pharmacy-related but healthcare-related	9 (23.7%)
	Non-healthcare related	9 (23.7%)
What is the highest educational level you have achieved before joining the pharmacy program at Howard?	Pre-pharmacy or an associate degree	7 (17.5%)
	BSc/BA/MA/MSc or higher education	33 (82.5%)

Table 3 summarizes the results of the opinion-based questions answered by respondents. Based on the comparison between students' opinions and findings from the literature review regarding stretch marks, it is evident that there is a notable alignment in certain areas but while discrepancies exist in others.

For example, most students (80.6%) concur with the literature, indicating that stretch marks typically exhibit color upon their initial appearance on the skin, often manifesting as red, purple, or pink marks due to underlying blood vessels. Similarly, a substantial consensus among students (91.7%) and the literature acknowledges the presence of multiple types of stretch marks, encompassing reddish or purple marks (*striae rubrae*) as well as silvery or white marks (*striae albae*), which may vary depending on individual factors.

However, discrepancies arise concerning the expectations of stretch marks disappearing over time without treatment. While a considerable proportion of students (44.4%) believe in the possibility, the literature suggests otherwise, indicating that while some marks may fade, they typically do not vanish completely without intervention.

Furthermore, there is disagreement among students regarding whether stretch marks are considered a medical disease, with a nearly equal split between those who agree and disagree. Conversely, the literature supports the notion that stretch marks are not classified as a medical disease but rather as a type of scarring resulting from rapid skin stretching.

Similarly, students are divided regarding the recommendation of home remedies such as cocoa butter, shea butter, vitamin E oil, and calendula oil for treating stretch marks. While some students (44.4%) do not recommend these remedies due to perceived inefficacy, the literature suggests that while results may vary, anecdotal evidence exists for their potential effectiveness in improving stretch mark appearance.

Table 3 The results of the opinion-based questions (n = 36)

Question	Strongly disagree/ Disagree (%)	n	Strongly agree/ Agree (%)	n	Evidence from the Literature Search
When stretch marks appear on the skin, they usually have color.	7 (19.4%)		29 (80.6%)		Agree: Stretch marks typically start as red, purple, or pink due to blood vessels showing through the skin but may fade to a lighter shade over time. This color change is due to the healing process as the marks mature.
There is more than one type of stretch marks.	3 (8.3)		33 (91.7)		Agree: There are two primary types of stretch marks: <i>striae rubrae</i> (reddish or purple marks) and <i>striae albae</i> (silvery or white marks). These marks can vary in appearance and severity depending on factors such as skin type and genetics.

Stretch marks should disappear over time even with no treatment.	16 (44.4%)	20 (55.6%)	Disagree: While some stretch marks may fade over time, they typically do not disappear completely without treatment.
Stretch marks are considered a medical disease.	17 (47.2%)	19 (52.8%)	Disagree: Stretch marks, while a common dermatological concern, is not classified as a medical disease. They are a type of scarring that occurs when the skin stretches rapidly, often due to factors like pregnancy, weight gain, or puberty.
I do not recommend any of the home remedies such as Cocoa Butter, Shea Butter, Vitamin E Oil, or Calendula Oil for stretch marks because they rarely work.	16 (44.4%)	20 (55.6%)	Disagree: While effectiveness may vary among individuals, some home remedies such as cocoa butter, shea butter, vitamin E oil, and calendula oil have shown anecdotal evidence of improving the appearance of stretch marks, though results are not guaranteed.

Table 4 summarizes the cumulative results of the knowledge-based questions from survey participants. The results shows that the survey participants demonstrated a solid understanding of various aspects related to stretch marks. The majority of participants correctly identified key facts about stretch marks, such as their association with rapid weight gain or changes (97% answered correctly), their classification as a type of scar (80% answered correctly), and their potential to cause irritation and itching (two-thirds answered correctly). However, there were some misconceptions, with slightly more than half of respondents incorrectly believing that stretch marks are only formed through pregnancy and that they appear more frequently on a person's hands. Overall, the average correct response rate for all knowledge-based questions was 72.18%, indicating a moderate level of understanding among survey participants.

Table 4 The results of the knowledge-based questions (n = 36)

Question	Correct Answer	True n (%)	False n (%)	Participants with Correct Answers n (%)
Stretch marks usually appear on the skin from rapid weight gain/weight changes.	True	35 (97.2%)	1 (2.8%)	35 (97.2%)
Stretch marks are only formed through pregnancy.	False	15 (41.7%)	21 (52.5%)	21 (52.5%)
Stretch marks appear more frequently on a person's hands.	False	16 (44.4%)	20 (55.6%)	20 (55.6%)
A stretch mark is a type of scar.	True	29 (80.6%)	7 (19.4%)	29 (80.6%)
Stretch marks are known to be sometimes irritable, and itchy.	True	27 (75.0%)	9 (25.0%)	27 (75.0%)
Overall Score n (%)				36 (72.18%)

The next table (Table 5) highlights the statistical significance observed when comparing the opinion-based questions. There is a significant correlation between the level of education and the understanding of dermatological concepts, specifically regarding the diversity of stretch marks. Participants with a Bachelor of Science (BSc), Bachelor of Arts (BA), Master of Arts (MA), or higher education were more inclined to strongly agree or agree with the statement "There is more than one type of stretch mark." This finding suggests that individuals with higher educational attainment may possess a better grasp of dermatological concepts related to stretch marks.

Table 5 The results of the opinion-based questions compared to student demographics, education, or work experience. (n = 36)

Question: There is more than one type of stretch mark vs. the Highest educational level.			
Comparator	Strongly disagree/ Disagree n (%)	Strongly agree/Agree n (%)	Pearson's R Asymptotic Standard Error
Pre-pharmacy or an associate degree	0 (0%)	5 (13.9%)	0.044
BSc/BA/MA/MSc or higher education	3 (8.3%)	28(77.8%)	

The key finding from this analysis, as shown in Table 6, is that various demographic factors influence individuals' understanding of stretch marks. Younger individuals, particularly those aged 18 to 30, exhibit a better grasp of the causes of stretch marks compared to older age groups, indicating a generational difference in awareness. Moreover, individuals working in pharmacy-related professions demonstrate a higher understanding of stretch marks than those in non-pharmacy-related healthcare or non-healthcare fields, suggesting that professional exposure plays a role in knowledge acquisition. Additionally, higher educational attainment is associated with a better understanding of stretch marks, emphasizing the impact of education on knowledge levels.

Lastly, female participants exhibit a stronger understanding of stretch marks than male participants, potentially influenced by societal norms and greater skincare awareness among women. Overall, these findings underscore the importance of considering demographic factors when assessing knowledge levels and designing educational interventions regarding dermatological conditions like stretch marks.

Table 6 The results of the knowledge-based questions compared to student demographics, education, or work experience. (n = 36)

Question: Stretch Marks usually appear on the skin from rapid weight gain/weight changes vs. the following factors:			
Question vs. Comparator	Participants with Correct Answers n (%)	Pearson's R Asymptotic Standard Error	
Age (Years)			
18 to 30	31 (86.1%)	0.033	
30 to > 40	4 (11.1%)		
Type of work they have had.			
Pharmacy related.	19 (55.9%)	0.047	
Non-pharmacy related but healthcare related.	6 (17.6%)		
Non-healthcare related	8 (23.5%)		
Highest educational level.			
Pre-pharmacy or an associate degree	5 (13.9%)	0.037	
BSc/BA/MA/MSc or higher education	30 (83.3%)		
Gender			
Male	9 (25.0%)	0.051	
Female	26 (72.2%)		

5 Discussion

The presence of stretch marks can substantially affect the quality of life for women, underscoring the significance of investigating alternative treatment options. This study had a dual objective. Firstly, to conduct a comprehensive review of the literature to evaluate the effectiveness of various herbal remedies in addressing stretch marks. Secondly, to assess the knowledge and opinions of pharmacy students concerning this subject matter.

The literature review of herbal remedies for stretch marks highlights inconclusive findings regarding their efficacy, with cocoa butter, shea butter, vitamin E, and calendula oil being among the most studied. While cocoa butter and shea butter show potential for moisturizing and providing anti-inflammatory benefits, research on their effectiveness in preventing stretch marks remains inconclusive. Similarly, trials examining the role of vitamin E in stretch mark prevention during pregnancy have not shown significant benefits, despite its antioxidant properties. Calendula oil, with its antioxidant and anti-inflammatory effects, shows promise for improving skin hydration and firmness. However, there is a notable scarcity of literature on healthcare professionals' perceptions of herbal treatments for stretch marks, indicating a gap in knowledge in this area.

Regarding the survey, it was conducted among first-year pharmacy students and their demographics, work history, and educational background data was collected. The majority of respondents were female (75%), and a significant proportion fell within the 18 to 30 age range (90%). Most respondents lived in the Virginia, Maryland, or District of Columbia area, although some were from other states before joining the pharmacy program. Two-thirds of students reported having over 3 years of work experience, with half of them being in pharmacy-related fields. Furthermore, over 80% of students indicated that they possessed at least a bachelor's degree or higher before enrolling in the College of Pharmacy at Howard University.

The second portion of the survey assessed the perceptions and knowledge of students concerning stretch marks and herbal treatments. Out of the 40 students asked, 36 responded, precipitating a 90% response rate. In the opinion-based surveys, students were tasked with stating whether they strongly agreed, agreed, strongly disagreed, or disagreed with a statement. The responses were then reduced to two categories to be assessed, including strongly agreed/agreed or strongly disagreed/disagreed.

The findings from the survey revealed several key points regarding participants' perceptions of stretch marks. Most respondents acknowledged that stretch marks often manifest color upon appearance and recognized the existence of different types of stretch marks. However, slightly over half of the participants considered stretch marks as a medical condition, with some holding the belief that they should naturally fade over time without intervention. Interestingly, over half (55%) of participants agreed they do not recommend home remedies for stretch marks, because they rarely work.

The comparison between student opinions and literature findings underscores the importance of critically assessing and incorporating evidence-based information into discussions about stretch marks and their management. While there are areas of agreement between student perspectives and existing research, discrepancies highlight the need for a nuanced understanding of this dermatological concern. The knowledge-based survey revealed a generally solid grasp of certain key aspects of stretch marks among participants, with nearly all respondents (97%) correctly acknowledging that stretch marks usually appear on the skin due to rapid weight gain or changes.

However, notable misconceptions were identified, such as slightly over half of respondents incorrectly believing that stretch marks are exclusively formed through pregnancy and that they appear more frequently on a person's hands. Additionally, while 80% of participants correctly identified stretch marks as a type of scar, two-thirds answered affirmatively regarding their potential to cause irritation and itching. This emphasizes the importance of ongoing education and awareness efforts to ensure accurate knowledge dissemination and informed decision-making in the realm of stretch mark management.

The final analyses assessed if there was a statistically significant correlation between student demographics, education, or work-related backgrounds when answering the knowledge-based and opinion-based questions. Chi-square tests and symmetric measures (interval by interval) were performed to determine statistical significance based on the Pearson R asymptotic standard error. Statistical significance was proven if the p-value was less than or equal to 0.05. The findings highlight several important associations between demographic factors and knowledge or opinions regarding stretch marks.

Individuals with higher levels of education, such as those holding a BSc, BA, MA, or higher degree, were more likely to acknowledge the existence of multiple types of stretch marks. Furthermore, age, work experience, education level, and gender all influenced respondents' understanding of the statement "Stretch marks usually appear on the skin from rapid weight gain or weight changes." Younger participants (aged 18 to 30) were more likely to recognize the association between stretch marks and rapid weight changes compared to older individuals. Similarly, those with pharmacy-related work experience or higher educational attainment exhibited greater comprehension of this aspect.

Interestingly, females demonstrated a higher rate of correct responses compared to males, suggesting potential differences in awareness or knowledge levels between genders. Overall, these findings underscore the importance of considering demographic factors when addressing knowledge and perceptions related to stretch marks, emphasizing the need for targeted educational initiatives tailored to different demographic groups.

We conducted a thorough literature search to exhaust available evidence and complement it with valuable insights from survey results. While our analyses shed light on the correlation between student demographics, education, and work-related backgrounds, it's crucial to acknowledge several limitations. Firstly, the study's small sample size, consisting of 40 first-year pharmacy students from a single college, raises concerns about selection bias and limits the generalizability of the findings. Furthermore, focusing exclusively on pharmacy students without including participants from other healthcare disciplines restricts the diversity of perspectives. Additionally, the study's single-university setting may not fully capture the perspectives of students across different academic environments. Therefore, larger-scale studies are warranted to validate the survey findings comprehensively.

6 Conclusion

In summary, various opinions and perceptions exist regarding stretch marks and subsequent treatments for them, such as herbals. Stretch marks can take an emotional and psychological toll on those who have them, and healthcare professionals need to be cognizant of the herbal treatments that are available on the market. The objective of this study was twofold: to conduct an extensive literature review on the use of herbal remedies for stretch marks and to administer a survey among students to assess their knowledge and opinions on the topic. While the study found alignment with existing literature on certain aspects of stretch marks, discrepancies were observed in opinions, particularly concerning the effectiveness of home remedies and the natural fading of stretch marks over time. Despite demonstrating a solid understanding of key facts, participants held misconceptions, such as the belief that stretch marks are exclusively associated with pregnancy. Additionally, demographic variables such as education level, age, work experience, and gender influenced participants' comprehension of stretch marks, highlighting the necessity for tailored educational interventions. The study acknowledges limitations, including a small sample size from a single university, and suggests larger-scale studies involving diverse participant groups for comprehensive validation. Overall, the findings offer valuable insights into pharmacy students' knowledge and perceptions of stretch marks, emphasizing the importance of targeted educational initiatives and further research in this field.

Compliance with ethical standards

Acknowledgments

All first-year pharmacy students at Howard University who participated in the survey are acknowledged.

Disclosure of conflict of interest

The authors declare no conflict of interest. The survey was approved by Howard University IRB as part of a Drug Information course.

Statement of ethical approval

The present research work does not contain any studies performed on animals/humans' subjects except conducting a survey by any of the authors'.

Statement of informed consent

The study is approved by the Howard University Institute Review Board (IRB) as a survey study.

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