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## Obstacles to skin self-examination: are frontier adults inclined abstainers?

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### ABSTRACT

Individuals residing in U.S. frontier counties have limited access to dermatology care and higher melanoma mortality rates. Given these limitations, frontier residents rely disproportionately on skin self-examinations (SSE) for early detection of melanoma, though little is known about their SSE behaviors and barriers to conducting SSEs. The goal of the present study was to identify obstacles to SSE performance via a survey of adults ( $N = 107$ ) living in a U.S. frontier county. Approximately 43% of participants were classified as *inclined abstainers* – individuals who intended to perform SSE, but failed to follow through. Compared to those who did follow through, inclined abstainers were more likely to be hindered by twelve barriers, including forgetting, letting other tasks get in the way of SSE, and struggling to identify a good time or routine for SSE performance. The barriers to action for these inclined abstainers are modifiable – for example, not remembering to do it – and well positioned for a behavioral intervention.

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SSE; barriers; inclined abstainers; frontier county; rural; skin cancer

The incidence rate of melanoma has been steadily increasing over the last three decades (Siegel, Miller, & Jemal, 2017). The increase in melanoma is problematic for many communities, but it is notably concerning for those living in U.S. frontier counties. Frontier counties, defined as having fewer than seven people per square mile, represent geographically remote communities with limited infrastructure, low population density, and significant distance to basic services, putting them at the greatest risk for melanoma among various rural subpopulations (Nayer, Yu, & Apenteng, 2013; Vaidya, Zubritsky, Alikhan, & Housholder, 2017). Frontier populations are less likely to wear sunscreen compared to their urban counterparts, and they have less access to dermatologists; a combination that increases melanoma mortality rates for those living in frontier counties (Aneja, Aneja, & Bordeaux, 2012; Vaidya et al., 2017; Zahnd, Goldfarb, Scaife, & Francis, 2010).

Dermatologists have indicated there is a pressing need to find and promote strategies that improve identification of high-risk individuals and suspicious lesions, especially for

those living in frontier areas (Aneja et al., 2012; Goodson & Grossman, 2009; US Preventive Services Task Force, 2009). Current recommendations instruct individuals to conduct regular skin self-examinations (SSEs) to aid in early detection of suspicious lesions (Goodson & Grossman, 2009). Several studies have found that SSE can reduce melanoma mortality, perhaps by as much as 63%, though there are concerns about SSE efficacy and subsequent identification of lesions by those at risk (Berwick, Begg, Fine, Roush, & Barnhill, 1996; Goodson & Grossman, 2009; Hamidi, Peng, & Cockburn, 2010; King, Gehl, Grossman, & Jensen, 2013).

While SSE has the potential to reduce melanoma mortality, a fundamental challenge that needs to be addressed is that most individuals fail to perform SSE (Arnold & DeJong, 2005; Jensen & Moriarty, 2008; Weinstock et al., 1999). Less than half of U.S. adults report ever examining their skin for cancerous lesions and the number drops further if one considers the thoroughness of the exam (Jensen & Moriarty, 2008; Miller et al., 1996; Weinstock et al., 1999). Yet, it is not known whether adults living in frontier counties exhibit similar patterns. Despite their increased risk, and potentially increased reliance on SSE, little is known about SSE performance in frontier adults.

Why do people fail to perform SSEs? Researchers are still trying to answer this question, but existing data suggests that many people intend to act but fail to follow through (Arnold & DeJong, 2005; Jensen & Moriarty, 2008; Weinstock et al., 1999). In behavioral medicine, individuals who intend to perform a behavior, but fail to follow through are labeled *inclined abstainers* (Gollwitzer & Sheeran, 2006; Sheeran & Webb, 2016). Across a variety of behaviors, research has shown that approximately half (47%) of those who intend to act become inclined abstainers (Sheeran, 2002). Inclined abstainers are often undermined by six obstacles: (1) forgetting to perform the behavior, (2) failing to seize good opportunities to act, (3) reluctance to act when opportunities arise, (4) falling prey to bad habits, (5) unwanted attention responses, and (6) detrimental self-states (Gollwitzer & Sheeran, 2006).

Inclined abstainers are a concern, but they also represent a significant opportunity as these individuals are already motivated to act if barriers can be addressed (Sheeran, 2002). Thus, in addition to quantifying SSE performance and barriers for adults living in frontier counties, it is valuable to examine whether some might be categorized as inclined abstainers. Moreover, identifying which barriers tend to hinder frontier inclined abstainers – perhaps uniquely compared to other members of the population – might reveal an avenue for future behavioral interventions designed to increase SSE in this population.

The current study surveyed U.S. adults living in a frontier county to assess obstacles to performing SSE (RQ1), and whether those obstacles align with the barriers identified in inclined abstainer research (RQ2). We also sought to examine whether inclined abstainers in a frontier county were more likely to be hindered by certain SSE barriers compared to inclined actors (RQ3) – i.e. individuals who follow through with their intentions. Few studies examine frontier counties, as a natural barrier to conducting research relates to their isolation from infrastructures related to medicine, public health, and higher education. The present study offers a unique perspective by answering key research questions essential to improving skin cancer control in these remote rural areas.

## Methods

### Participants

Adults ( $N = 107$ , *Mean age* = 44.3 years, *SD* = 16.9) from a frontier county (McCone) in Montana were recruited to participate in a survey study. McCone County is 1 of 46 frontier counties in Montana. The county is large (2,643.17 square miles) with a population of 1,734, a population density of 0.7 persons per square mile, with most residents classified as white (95.9%), attained a high school education or higher (93.3%), and a reported median age of 51.2 years (U.S. Census Bureau, 2016).

Participants were recruited via a county newspaper, a booth at the county fair, and via posters placed in businesses located in the governmental center of the county (Circle, MT). Participants received \$25 for completing the survey. All methods and procedures were approved by a University Institutional Review Board.

### Measures

Participants provided responses to items assessing demographics, skin cancer risk via the brief skin cancer risk assessment tool (BRAT), and SSE frequency, 'how often did you perform a skin self-exam in the past year?', with response options including *once*, *twice*, *three times*, and *more than three times*, as well as SSE intentions in the next 30 days with response options including *very unlikely*, *unlikely*, *likely*, and *very likely* (Glanz et al., 2003; Jensen & Moriarty, 2008; Robinson, Fisher, & Turrissi, 2002). Additionally, implementation intentions research postulates that a small number of predictable barriers hinder performance. Twenty SSE barrier items were culled from multiple studies and measured on a five-point scale with response options *strongly disagree* to *strongly agree* (Hay et al., 2006; Jensen & Moriarty, 2008; Robinson et al., 2002). All twenty items, their shorthand labels, means, and standard deviations are reported in Table 1.

### Analysis

RQ1 asked what barriers were related to SSE frequency and intentions in frontier populations. To answer this question, two hierarchical regressions were utilized to examine the multivariate relationship between demographics, SSE barriers, SSE frequency, and SSE intention. Demographics were placed in the first block (education, age, BRAT) and SSE barriers in the second block, rotating SSE frequency and intentions as outcomes. A hierarchical regression allows researchers to examine how variables (barriers and SSE intentions) are related above and beyond known predictors (demographics). RQ2 asked whether there was evidence that SSE performance in frontier populations was undermined by inclined abstainers. To gauge that question, SSE frequency over the last year was examined in relation to intentions to perform an SSE in the next 30 days. Participants were categorized as inclined if they answered *likely* or *very likely* on the SSE intentions measure. They were categorized as abstainers if they reported performing an SSE three or less times in the last year. In other words, a participant was categorized as an inclined abstainer if he/she expressed a desire to perform an SSE in the next 30 days even though he/she had not adhered monthly in the past year. RQ3 asked whether inclined abstainers were more likely to be hindered by certain SSE barriers

**Table 1.** Means and standard deviations for SSE barrier items.

	Mean (SD)
I never think of performing skin self-exams. (THINK)	3.09 (1.26)
It's hard to remember to do it. (REMEMBER)	3.25 (1.11)
I always forget to perform skin self-exams. (FORGET)	3.01 (1.14)
There's never a good time to perform a skin self-exam. (GOOD TIME)	2.50 (.96)
I struggle to fit skin self-exams into my routine. (ROUTINE)	2.89 (1.04)
I don't have the time. (TIME)	2.49 (.90)
I prefer to let the doctor do it. (DOCTOR)	3.21 (1.14)
I do not want to find something. (FIND)	3.01 (1.32)
I do not have to check myself if I have a doctor do it once a year. (YEAR)	2.51 (.97)
I don't go looking for trouble. (TROUBLE)	2.76 (1.08)
I have more important problems than checking my skin. (IMPORTANT)	2.44 (.93)
I have thought about performing a skin self-exam, but something always gets in the way. (WAY)	2.46 (.86)
I sometimes start a skin self-exam, but get distracted by something else. (DISTRACTED)	2.36 (.88)
I am more likely to do a skin self-exam in warm weather. (WARM WEATHER)	2.98 (1.09)
If something changed on my body, then I wouldn't need a skin self-exam to notice it. (CHANGED)	2.62 (.92)
I check my arms and chest all the time, so I don't need to engage in formal skin self-exams. (FORMAL)	2.55 (.87)
In general, looking at my body makes me uncomfortable. (UNCOMFORTABLE)	2.60 (1.04)
When I think about doing skin self-exams I become anxious. (ANXIOUS)	2.38 (.89)
I do not like to look at my body. (LOOK)	2.60 (1.05)
I do not want to worry myself about my moles. (WORRY)	2.49 (.96)

Means and standard deviations for SSE barrier items. Each barrier item is also identified by a one or two-word shorthand, to facilitate discussion and the construction of other tables. For example, 'I never think of performing skin self-exams' is referred to as 'think' elsewhere.

compared to inclined actors. A MANOVA was utilized with implementation intention category (disinclined, inclined abstainer, inclined actor) as a fixed factor and all SSE barrier items as outcomes.

## Results

### *Participant characteristics*

Most participants were female (74.8%) and married (74.8%). All participants identified as white, with one participant also identifying as Hispanic. Education was dispersed as follows: high school degree or less (36.4%), associates or 2-year degree (23.4%), 4-year degree (27.1%), advanced degree (9.4%), and did not answer (2.8%). Income was not measured for participants, by request of community stakeholders, but McCone County has a median household income of \$40,750 and a poverty rate of 13.9%. The brief skin cancer risk assessment tool (BRAT) categorized participants as low risk (30.8%), moderate risk (43.0%), or high risk (26.2%). In other words, 69.2% of participants were moderate to high risk of developing skin cancer.

### *SSE barriers, frequency, & intentions*

For SSE frequency, the hierarchical regression was significant at both blocks (reported at block 2):  $R = .77$ ,  $R^2 = .60$ ,  $F(20, 72) = 3.49$ ,  $p < .001$  (see Table 2). SSE barriers explained 39% of the variance in SSE frequency. Four barriers (see Table 1) were related to SSE frequency: think, year, formal, and worry. For SSE intentions, the same hierarchical regression was utilized except that SSE frequency was included in block 1. The regression

**Table 2.** Hierarchical regressions analysis of predictors of SSE frequency/intention.

	SSE Frequency		SSE Intention	
	Beta	$R^2\Delta$	Beta	$R^2\Delta$
Block 1		.20***		.27***
Education	-.26**		.10	
Age	.19†		.07	
BRAT	.20*		-.09	
SSE Frequency	–		.47***	
Block 2		.39***		.23†
Think	-.31*		-.13	
Remember	-.06		.04	
Forget	.03		.11	
Good Time	-.10		-.20	
Routine	-.12		-.14	
Time	.03		-.12	
Doctor	-.06		-.09	
Find	.07		.22†	
Year	-.23†		-.15	
Trouble	-.15		-.04	
Important	-.04		-.32*	
Way	.06		.08	
Distracted	.07		.07	
Warm Weather	.08		.01	
Changed	-.15		.07	
Formal	.16†		.09	
Uncomfortable	-.09		-.05	
Anxious	-.19		-.17	
Look	.29		.35	
Worry	.23*		.09	

*N* = 105 (2 participants did not respond to the intention question). Hierarchical regression analysis. \**p* < .05 \*\**p* < .01 \*\*\**p* < .001.

was significant at both blocks (reported at block 2):  $R = .70$ ,  $R^2 = .49$ ,  $F(20, 71) = 1.59$ ,  $p = .08$ . Barriers explained 23% of the variance in intention. Two barriers (see Table 1) were related to SSE intention: important and find.

### Inclined abstainers

Approximately 43% ( $n = 45$ ) of participants were categorized as inclined abstainers based on SSE frequency over the last year and intentions to engage in an SSE in the next 30 days (see Table 3). Inclined actors constituted 17% ( $n = 18$ ) of participants whereas about 40% ( $n = 42$ ) of the sample was disinclined to act.

**Table 3.** Identifying inclined abstainers: Individuals who engaged in SSE three times or less in the last year, yet intend to do it in the next 30 days.

Prior SSE Frequency Over the Last Year	Intention to Engage in SSE in the Next 30 Days				Total N (Row %)
	Very Unlikely N (%)	Unlikely N (%)	Likely N (%)	Very Likely N (%)	
Never	6 (5.7%)	18 (17.1%)	16 (15.2%)	1 (1.0%)	41 (39.0%)
Once	3 (2.9%)	7 (6.7%)	12 (11.4%)	0 (0.0%)	22 (21.0%)
Twice	0 (0.0%)	5 (4.8%)	8 (7.6%)	1 (1.0%)	14 (13.3%)
Three Times	1 (1.0%)	0 (0.0%)	6 (5.7%)	1 (1.0%)	8 (7.6%)
More than Three Times	0 (0.0%)	2 (1.9%)	13 (12.4%)	5 (4.8%)	20 (19.0%)
Total N (Column %)	10 (9.5%)	32 (30.5%)	55 (52.4%)	8 (7.6%)	105 (100%)

*N* = 105 (2 participants did not respond to the intention question). Inclined abstainers (shaded in gray) were defined as those who had engaged in the behavior 3 times or less in the last year, but still intended to perform SSE in the next 30 days. Forty-five (42.85%) participants met the criteria of inclined abstainer.

## Inclined abstainers and SSE barriers

A significant multivariate effect was observed for implementation intention category, Pillai's Trace = .67,  $F(40, 158) = 1.97$ ,  $p = .002$ . Univariate tests revealed that twelve barriers loomed larger for inclined abstainers compared to inclined participants: think, remember, forget, good time, routine, time, doctor, year, trouble, important, way, and changed (see Table 4). Consistent with research on inclined abstainers, there were large differences for think, remember, forget, good time, routine, time, and way.

## Discussion

The best predictor of completing SSE over the past year was whether participants thought to perform the behavior. This finding is consistent with past SSE barrier research which has found that people often forget to think about SSE performance (Arnold & DeJong, 2005; Jensen & Moriarty, 2008). It is also consistent with inclined abstainer research which postulates that remembering to act is a common barrier to adherence (Gollwitzer & Sheeran, 2006).

Inclined abstainer research has found that about 47% of those who intend to act fail to follow through (Gollwitzer & Sheeran, 2006) and the current study categorized approximately 43% of frontier adults as inclined abstainers. Compared to inclined actors, SSE inclined abstainers also seemed to be hindered by many of the six obstacles identified in prior research: they struggled to remember, let things get in the way, and failed to identify and seize good opportunities to act.

**Table 4.** MANOVA examining differences for SSE barrier items by implementation intention.

	Disinclined <i>M (SD)</i>	Inclined Abstainers <i>M (SD)</i>	Inclined Actors <i>M (SD)</i>	<i>F</i>
Think	3.60 (1.13) <sup>a</sup>	3.05 (1.25) <sup>b</sup>	2.00 (1.03) <sup>c</sup>	10.94***
Remember	3.50 (.97) <sup>a</sup>	3.45 (1.09) <sup>a</sup>	2.06 (.77) <sup>b</sup>	13.62***
Forget	3.33 (1.05) <sup>a</sup>	3.05 (1.13) <sup>a</sup>	2.00 (.82) <sup>b</sup>	9.39***
Good Time	2.76 (.93) <sup>a</sup>	2.50 (.94) <sup>a</sup>	1.75 (.68) <sup>b</sup>	7.28**
Routine	3.12 (.86) <sup>a</sup>	3.00 (1.01) <sup>a</sup>	1.94 (.93) <sup>b</sup>	9.79***
Time	2.71 (.81) <sup>a</sup>	2.52 (.86) <sup>a</sup>	1.81 (.91) <sup>b</sup>	6.63**
Doctor	3.40 (1.01) <sup>a</sup>	3.33 (1.16) <sup>a</sup>	2.44 (1.03) <sup>b</sup>	5.03**
Find	2.83 (1.21) <sup>a</sup>	3.26 (1.29) <sup>a</sup>	2.50 (1.51) <sup>a</sup>	2.36
Year	2.86 (.95) <sup>a</sup>	2.45 (.89) <sup>b</sup>	1.63 (.50) <sup>c</sup>	11.71***
Trouble	2.74 (.96) <sup>a</sup>	3.17 (1.03) <sup>b</sup>	1.63 (.62) <sup>c</sup>	15.23***
Important	2.71 (.84) <sup>a</sup>	2.48 (.97) <sup>a</sup>	1.75 (.78) <sup>b</sup>	6.88**
Way	2.45 (.80) <sup>a</sup>	2.67 (.85) <sup>a</sup>	1.81 (.75) <sup>b</sup>	6.40**
Distracted	2.40 (.80) <sup>a</sup>	2.50 (.97) <sup>a</sup>	1.94 (.85) <sup>a</sup>	2.41
Warm Weather	3.14 (.95) <sup>a</sup>	3.00 (1.15) <sup>a</sup>	2.56 (1.26) <sup>a</sup>	1.65
Changed	2.86 (.84) <sup>a</sup>	2.60 (.99) <sup>a</sup>	2.06 (.77) <sup>b</sup>	4.57*
Formal	2.55 (.83) <sup>a</sup>	2.55 (.89) <sup>a</sup>	2.44 (.96) <sup>a</sup>	.11
Uncomfortable	2.74 (.96) <sup>a</sup>	2.50 (1.09) <sup>a</sup>	2.56 (1.21) <sup>a</sup>	.55
Anxious	2.43 (.91) <sup>a</sup>	2.43 (.89) <sup>a</sup>	2.13 (.89) <sup>a</sup>	.77
Look	2.74 (.99) <sup>a</sup>	2.48 (1.13) <sup>a</sup>	2.56 (1.09) <sup>a</sup>	.64
Worry	2.57 (.89) <sup>a</sup>	2.50 (1.04) <sup>a</sup>	2.25 (1.00) <sup>a</sup>	.64
<i>N</i>	42	45	18	105

*N* = 105 (2 participants did not respond to the intention question). Each barrier item is described by a one or two word term; see Table M for the full items. By row, means that do not share a superscript are significantly different,  $p < .05$ . For example, all of the means for think are significantly different as none of them share a superscript. \* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ .



When behavioral researchers identify a significant number of inclined abstainers for a target behavior they typically recommend (what has come to be known as) an implementation intentions intervention (Gollwitzer & Sheeran, 2006). For inclined abstainers, routine behaviors can be increased by directing populations toward triggering events that elicit automatic response (Gollwitzer, 1999; Gollwitzer & Sheeran, 2006). Thus, the key to successful interventions is identifying good opportunities to act and transforming them into triggering events. In traditional implementation intention interventions, participants are asked to consider what they want to do and where they plan to initiate it. This is the if-then triggering event of implementation intention research: anticipated situation (if) and specified response (then). From a mechanism standpoint, implementation intentions help people to remember to act, seize opportunities, and overcome initial reluctance (Gollwitzer & Sheeran, 2006).

A meta-analysis of 94 studies found that implementation interventions typically had a medium effect on goal achievement ( $d = .65$ , 95% confidence interval: .60, .70; Gollwitzer & Sheeran, 2006). Interventions had similar impacts on behavior whether it was measured objectively or as a self-report. To date, three studies have tested implementation intention interventions in the context of cancer screening, including one targeting testicular self-examination, one targeting breast self-examination, and one targeting cervical cancer screening (Orbell, Hodgkins, & Sheeran, 1997; Sheeran & Orbell, 2000; Steadman & Quine, 2004). The mean effect across these three interventions is consistent with the observed effect in the larger meta-analysis ( $d = .69$ ).

The current study focused on frontier adults, thus, it is valuable to consider whether some of the identified barriers loom larger for those living in remote areas with limited infrastructure. First, several barriers are grounded in the assumption that SSEs are unnecessary because doctors will carry out this preventive behavior (doctor, year). It is understandable that patients prefer to have healthcare providers carry out screening behaviors, but it also runs counter to the infrastructure limitations of rural and frontier counties. Past research has demonstrated that individuals living in rural and frontier areas are less likely to have access to dermatologists or other healthcare providers trained in clinical skin examination (Aneja et al., 2012; Vaidya et al., 2017; Zahnd et al., 2010). Similarly, frontier adults noted that they were less likely to conduct SSEs because they had ‘more important problems than checking’ their skin (important). This resonates with past work on rural and frontier counties which have consistently found significant infrastructure and healthcare issues in these areas (Nayer et al., 2013). Put differently, residents of these counties are facing a number of obstacles and threats, many of which are immediate and acute. The remaining barriers that were significant seem to equally important to individuals living in frontier and urban areas; for example, failing to remember is a barrier that exists at the individual level rather than a direct byproduct of infrastructure. Yet, researchers should be mindful that it is possible that other barriers are different or more problematic for frontier groups, perhaps in ways that are not immediately apparent. As an example, frontier populations are more isolated and less population dense; both factors that decrease the potential size and reach of social connections (Nayer et al., 2013). To the extent that densely populated social networks prove meaningful to enacting SSE behaviors, it is possible that these barriers will be more problematic in less populated areas.



## Limitations

The current study was limited in several ways. Recruiting participants in frontier counties is a challenge, notably due to limited infrastructure and extremely low population density. The sample of the current study is modest; a larger sample would facilitate more complex data analysis. Moreover, the sample is best described as frontier adults, not rural, and that future research should examine SSE and sun behaviors in rural populations (see, e.g. Nagelhout et al., 2019). The sample was also skewed in several ways, notably in terms of sex (most participants were female) and race (all participants self-identified as White). The former is a notable concern as melanoma mortality rates are higher in older men (Siegel et al., 2017), a group underrepresented in the current study. Future research should seek to stratify by sex, but if that should once again prove difficult, then it is important to note that female populations have significant value in SSE research because of their own risk and the likelihood that they will perform partner-assisted SSEs. Indeed, partner-assisted SSE is relatively commonplace (Robinson et al., 2002), males assisted by female partners tend to miss fewer lesions during SSE (Boone et al., 2016), and SSEs are more effective overall when conducted with a partner (Robinson, Turrisi, & Stapleton, 2007). The survey instrument relied on participant self-report, a method that is limited based on participant understanding of the questions being asked and willingness to provide accurate answers. Importantly, self-reported SSE behavior is vulnerable to question effects as past research has noticed variance in response based on subtle features of the question (Jensen & Moriarty, 2008; Weinstock et al., 1999). Improved measurement, and alternative data collection methods, would bolster the evidence base.

## Conclusion

In terms of SSE performance, many adults living in frontier counties are inclined abstainers. Given the public health and medical realities of those living in frontier counties, considering innovative interventions that move inclined abstainers to action is an important goal for public health advocates to pursue. Future research should evaluate whether implementation intention interventions can shift abstainers toward adherence. The identification of inclined abstainers is promising as it suggests there is a sizable population that may be rife for behavior change and implementation intention interventions would likely be feasible to implement within frontier counties.

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## References

- Aneja, S., Aneja, S., & Bordeaux, J. S. (2012). Association of increased dermatologist density with lower melanoma mortality. *Archives of Dermatology*, 148, 174–178.
- Arnold, M. R., & DeJong, W. (2005). Skin self-examination practices in a convenience sample of U.S. university students. *Preventive Medicine*, 40, 268–273.
- Berwick, M., Begg, C. B., Fine, J. A., Roush, G. C., & Barnhill, R. L. (1996). Screening for cutaneous melanoma by skin self-examination. *Journal of the National Cancer Institute*, 88, 17–23.
- Boone, S. L., Stapleton, J., Turrisi, R., Ortiz, S., Robinson, J. K., & Mallett, K. A. (2016). Thoroughness of skin examination by melanoma patients: Influence of age, sex, and partner. *Australasian Journal of Dermatology*, 50(3), 176–180.
- Glanz, K., Schoenfeld, E., Weinstock, M. A., Layi, G., Kidd, J., & Shigaki, D. M. (2003). Development and reliability of a brief skin cancer risk assessment tool. *Cancer Detection and Prevention*, 27, 311–315.
- Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist*, 54, 493–503.
- Gollwitzer, P. M., & Sheeran, P. (2006). Implementation intentions and goal achievement: A meta-analysis of effects and processes. *Advances in Experimental Social Psychology*, 38, 69–119.
- Goodson, A. G., & Grossman, D. (2009). Strategies for early melanoma detection: Approaches to the patient with nevi. *Journal of the American Academy of Dermatology*, 60, 719–735.
- Hamidi, R., Peng, D., & Cockburn, M. (2010). Efficacy of skin self-examination for the early detection of melanoma. *International Journal of Dermatology*, 49, 126–134.
- Hay, J. L., Oliveria, S. A., Dusza, S. W., Phelan, D. L., Ostroff, J. S., & Halpern, A. C. (2006). Psychosocial mediators of a nurse intervention to increase skin self-examination in patients at high risk for melanoma. *Cancer Epidemiology, Biomarkers, & Prevention*, 15, 1212–1216.
- Jensen, J. D., & Moriarty, C. M. (2008). Psychosocial factors associated with skin self-exam performance. *Journal of American College Health*, 56, 701–705.
- King, A. J., Gehl, R. W., Grossman, D., & Jensen, J. D. (2013). Skin self-examinations and visual identification of atypical nevi: Comparing individual and crowdsourcing approaches. *Cancer Epidemiology*, 37, 979–984.
- Miller, D. R., Geller, A. C., Wyatt, S. W., Halpern, A., Howell, J. B., & Koh, H. K. (1996). Melanoma awareness and self-examination practices: Results of a United States survey. *Journal of the American Academy of Dermatology*, 34, 962–970.
- Nagelhout, E. S., Parsons, B. G., Haaland, B., Tercyak, K. P., Zaugg, K., Zhu, A., ... Wu, Y. P. (2019). Differences in reported sun protection practices, skin cancer knowledge, and perceived risk for skin cancer between rural and urban high school students. *Cancer Causes and Control*, 30(11), 1251–1258.
- Nayer, P., Yu, F., & Apenteng, B. A. (2013). Frontier America's health system challenges and population health outcomes. *The Journal of Rural Health*, 29, 258–265.
- Orbell, S., Hodgkins, S., & Sheeran, P. (1997). Implementation intentions and the theory of planned behavior. *Personality and Social Psychology Bulletin*, 23, 945–954.
- Preventive Services, U. S., & Force, T. (2009). Screening for skin cancer: U.S. Preventive Services Task Force recommendation statement. *Annals of Internal Medicine*, 150, 188–193.
- Robinson, J. K., Fisher, S. G., & Turrisi, R. J. (2002). Predictors of skin self-examination performance. *Cancer*, 95, 135–146.
- Robinson, J. K., Turrisi, R., & Stapleton, J. (2007). Efficacy of a partner assistance intervention designed to increase skin self-examination performance. *JAMA Dermatology*, 143(1), 37–41.

- Sheeran, P. (2002). Intention-behavior relations: A conceptual and empirical review. *European Review of Social Psychology*, 12(1), 1–36.
- Sheeran, P., & Orbell, S. (2000). Using implementation intentions to increase attendance for cervical cancer screening. *Health Psychology*, 19, 283–289.
- Sheeran, P., & Webb, T. L. (2016). The intention-behavior gap. *Social and Personality Psychology Compass*, 10(9), 503–518.
- Siegel, R. L., Miller, K. D., & Jemal, A. (2017). Cancer statistics, 2017. *CA: A Cancer Journal for Clinicians*, 67, 7–30.
- Steadman, L., & Quine, L. (2004). Encouraging young males to perform testicular self-examination: A simple, but effective, implementation intentions intervention. *British Journal of Health Psychology*, 9, 479–487.
- U.S. Census Bureau. (2016). U.S. Census Bureau quickfacts selected: McCone County, Montana. Retrieved from: <https://www.census.gov/quickfacts/fact/table/mcconecountymontana/PST120216>
- Vaidya, T., Zubritsky, L., Alikhan, A., & Housholder, A. (2017). Socioeconomic and geographic barriers to dermatology care in urban and rural U.S. populations. *Journal of the American Academy of Dermatology*, 76(6), AB239.
- Weinstock, M. A., Martin, R. A., Risica, P., . M., Berwick, M., Lasater, T., Rakowski, W., . . . Dube, C. E. (1999). Thorough skin examination for the early detection of melanoma. *American Journal of Preventive Medicine*, 17(3), 169–175.
- Zahnd, W. E., Goldfarb, J., Scaife, S. L., & Francis, M. L. (2010). Rural-urban differences in behaviors to prevent skin cancer: An analysis of the health information national trends survey. *Journal of the American Academy of Dermatology*, 62, 950–956.