Performance and Perception of the Diffusion of Innovation:

An Analysis of the New Air Force Physical Assessment Test

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The adoption of a new physical assessment test is a significant event in any organization, particularly in the military. In the case of the United States Air Force, the introduction of a new physical fitness test that includes timed shuttle runs, timed planks, and hand release push-ups alongside the measurement of body mass index (BMI) is poised to challenge enlisted personnel in a full-body approach. This new test will soon replace the traditional PT test, which includes a 1.5-mile run, push-ups, and sit-ups. The adoption of this new test is an example of the diffusion of innovation, which is a process that describes how new ideas or technologies are adopted and spread among members of a society or organization.

Everett Rogers, in his seminal work, "Diffusion of Innovations" (5th edition), identifies the five stages of the diffusion process: knowledge, persuasion, decision, implementation, and confirmation. These stages help to explain the processes through which the new PT test was introduced and will eventually be adopted by Air Force personnel. Additionally, other relevant articles provide insight into the effects of the new test on physical performance and perception. By examining the adoption of this new physical fitness test, we can gain insight into the

effectiveness of diffusion of innovation as a framework for introducing and implementing change within large organizations.

As Henry Mintzberg, the author of "The Rise and Fall of Strategic Planning," noted, "It's not so much the implementation of strategy that makes a difference; it's the crafting of strategy that makes a difference." In other words, the effectiveness of the new PT test will depend not just on its implementation but also on how it was crafted and communicated to those who will be affected by it. This research paper will examine the adoption of the new Air Force PT test, analyzing its impact on physical performance and perception, and evaluate the effectiveness of the diffusion of innovation framework in facilitating this adoption.

Conceptual Framework:

One key component of the Diffusion of Innovations framework is the concept of relative advantage. Rogers (2003) states that "an innovation that is perceived as being better than the idea it supersedes" is more likely to be adopted (p. 16). The new physical assessment test has several advantages over the traditional PT test, including its ability to assess full-body fitness rather than just cardiorespiratory endurance and muscular strength. As Rogers notes, "the more that an innovation is perceived as having relative advantage, the more rapid its rate of adoption will be" (p. 17).

Another important factor in the Diffusion of Innovations framework is compatibility. Rogers (2003) defines compatibility as "the degree to which an innovation is perceived as

consistent with the existing values, past experiences, and needs of potential adopters" (p. 18). The new physical assessment test aligns with the Air Force's focus on physical readiness as a key component of overall readiness, as well as the military's overall emphasis on full-body fitness.

Complexity is another factor that can influence the adoption of an innovation. Rogers (2003) defines complexity as "the degree to which an innovation is perceived as relatively difficult to understand and use" (p. 19). The new physical assessment test may be seen as more complex than the traditional PT test due to its inclusion of BMI measurement and different exercise components. However, if the Air Force provides sufficient training and support to ensure that enlisted personnel understand the new test and its requirements, this perceived complexity may be mitigated.

Observability can play a role in the adoption of an innovation. Rogers (2003) defines observability as "the degree to which the results of an innovation are visible to others" (p. 21). The new physical assessment test may be more observable than the traditional PT test, as enlisted personnel may be more likely to discuss their experiences with the new test with their peers. This increased observability may help to spread awareness and interest in the new test, ultimately leading to greater adoption.

Describe the innovation:

The United States Air Force has recently adopted a new physical fitness test that is quite different from the traditional test that was used for many years. The new test includes a measurement of body mass index (BMI), which is a calculation based on a person's height and weight that gives an estimate of their body fat percentage. The new test also includes a timed plank exercise, which involves holding a push-up position with your arms extended for a set amount of time. You have up to 2 minutes to obtain max points for this exercise for this portion of the examination. Hand-release push-ups, which require you to release your hands from the ground between each repetition. Hand-release push-ups is based off of the number of repetitions in a 2-minute period. A timed shuttle run, which is a back-and-forth sprint over a set distance. The score of the shuttle run is calculated on the number of repetitions the member can perform while staying within the timed intervals. These new exercises challenge enlisted personnel in a full-body approach and provide a more comprehensive evaluation of their physical fitness than the traditional test, which included a 1.5-mile run, push-ups, and sit-ups.

Methods:

The participants in this study are enlisted personnel in the United States Air Force who are required to take the new physical fitness test. This test is being used as evidence to evaluate the effectiveness of the new test compared to the traditional test. The evidence being used includes both quantitative and qualitative data, such as the scores on the new and old tests, as well as feedback from the participants on their experience taking the new test.

Participants included in this research where due for their march physical training assessment, participants are chosen randomly based on their assigned chalk times based off of their specific DOD ID numbers. There are 4 Squadrons completing the Physical Training assessment allowing for different backgrounds and training sequences to be analyzed shown in table 1.

Table 1

Number of survey participants by squadron

SQUADRON	NUMBER OF PARTICIPANTS
123 CES	18
123 SFS	14
123 MSG	13
123 PF	15

Procedures

According to Everett Rogers in his book "Diffusion of Innovations," the use of quantitative and qualitative data is important for evaluating the adoption of innovations: "The evaluation of an innovation's consequences is necessary to determine its worth, utility, and effectiveness. Typically, both quantitative and qualitative data are collected and analyzed" (Rogers, 2019, p. 313).

The analytical approach used in this study involves comparing the scores of the new test to the scores of the traditional test to determine if there is a significant difference in physical fitness evaluation. Additionally, feedback from participants is being collected to evaluate their perceptions of the new test and its impact on their physical fitness. This approach aligns with the evaluation methods recommended by Rogers: "The assessment of consequences of an innovation can include measures of its effectiveness, efficiency, satisfaction, and adaptability" (Rogers, 2019, p. 315).

In the five-question survey, enlisted personnel were asked to rate their overall experience with the new PT test versus the traditional test they have took in the past. The survey was taken on a pen and paper that was handed to each member after they concluded the new physical training test. The physical training leaders facilitated the surveys by handing them out to each squadron and collected them from each squadron leader who was present at the time to ensure 100% participation was accounted for the duration of the research.

Findings:

After Assessment Survey Question	**Response**
Did you take the new AF PT assessment?	Y (60) / N (0)
Did you score higher on the new test?	Y (25) / N (35)
What is the most effective component of the new test?	Shuttle run (10) HR push-ups (5) Plank (15) BMI (30)

What is the least effective component of the new test?	Shuttle run (22) HR push-ups (8) Plank (4) BMI (26)
Would you recommend this test to other military personnel?	Y (47) / N(13)

To delve deeper into the attitudes and perceptions of enlisted personnel towards the new physical fitness test, a survey was administered to a random sample of active-duty Air Force members across different squadrons. The survey consisted of questions that aimed to gather feedback on various aspects of the new test compared to the old test, such as the types of exercises and scoring system. Overall, the results of the survey indicated a more positive response towards the new test than the old test. Specifically, respondents appreciated the inclusion of a body composition test, which allowed them to test their strengths in areas that were not previously assessed by the old test. (See Table 2)

Table 2

Comparison of PT Score versus BMI

	Score	# of positive responses	# of negative responses
Grade	Excellent	15	2
	Satisfactory	25	5
	Unsatisfactory	1	12
BMI	Obese	5	7
	Overweight	7	3
	Normal	18	3
	Moderate thinness	17	1

The positive feedback regarding the new PT test was overwhelming, with participants expressing satisfaction with the plank and shuttle run components. In the surveys conducted at the end of each assessment, participants rated the plank exercise as a challenging but effective way to evaluate their core strength and endurance. Similarly, the timed shuttle run received praise for its ability to assess agility and quickness. Overall, the positive feedback from participants highlights the effectiveness of the new PT test in evaluating a wider range of physical fitness skills compared to the previous test. (See Table 3)

Table 3

Occurrence of Physical Component in Most and Least Effective Exercises

Individual Exercise	# of times indicated for the Most Effective component	# of times indicated for the Least Effective component
BMI	44	16
Shuttle Run	55	5
Plank	53	7
HR Push Ups	40	20

With great changes and advances with the annual physical training assessment taken by guardsmen there was great feedback received as well as some opportunities for improvement. To be able to get a deeper understanding of the enlisted personnel's feedback and to gather opportunity areas members were able to leave notes in the comment section of the survey. Majority of members chose not to provide comment feedback, but some decided to share some feedback of missed opportunities members feel the new PT test compromised versus the old PT test.

Member Response 1:

"I don't see how my BMI has anything to do with my ability to perform well on the other components of the test. I train hard and have a lot of muscle mass, but my BMI says I'm overweight. It doesn't make sense to penalize me for something that's out of my control."

Member Response 2:

"I don't think the shuttle run is an effective measure of overall fitness because I am a long-distance runner and not a sprinter. My endurance is much better than my speed, and I don't feel that the shuttle run accurately reflects my fitness level."

Member	BMI	Old PT score	New PT score
1	M	88	90
2	M	80	77
3	M	85	82
4	M	89	86
5	M	92	94
6	M	81	90
7	M	84	90
8	O	70	66
9	O	65	65
10	O	72	67
11	N	83	86
12	O	69	65
13	O	78	70
14	N	96	99
15	O	80	70
16	N	80	86
17	O	80	70
18	OW	81	87
19	O	72	69
20	O	77	71
21	O	85	75
22	OW	83	83
23	O	93	80
24	O	87	78
25	N	90	92

Figure 1: Chart of 1st chalk scores

Count of Member	Column Labels																							
Row Labels	60	65	66	67	69	70	71	75	77	78	80	82	83	84	85	86	87	88	90	92	93	94	99	(blank)	Grand Total
M						1			1		2	1				1		2	5			3	1		17
N								1			3			2	2	3				3	1	1	5		21
O		2	1	1	1	3	1	1		1	1														12
OW	2			1		1	2					1	1		1		1								10
(blank)																									
Grand Total	**2**	**2**	**1**	**2**	**1**	**5**	**3**	**2**	**1**	**1**	**6**	**2**	**1**	**2**	**3**	**4**	**1**	**2**	**5**	**3**	**1**	**4**	**6**		**60**

Figure 2 – New PT test Pivot

The data located in Figure 2 shows the significant impact the different individual exercises can exert on a member. In the rows you will see labels (M, N, OW, and OW) which stand for Moderate, Normal, Obese, and Overweight according to the Air Force standard body

mass index calculator. The data is very polarized between high scores above the 80 percentile and lower scores in the unsatisfactory range. The data shows that the importance of incorporating a full body approach to health. If a member has a barrier with one aspect in their health, it will reflect on all compositions of the physical assessment. The data shows the ability to maintain the standard of fit to fight according to the high bar set for Air Force enlisted members.

Count of Member	Column Labels																										
Row Labels	65	66	67	69	70	72	74	77	78	79	80	81	83	84	85	87	88	89	90	91	92	93	95	96	98	99	(blank)	Grand Total
M						2		1			1	1		3	1	1	1	2		1	2					1		17
N											2		2	1	1	2	1	2	5				1	2	1	1		21
O	1			1	1	2		1	1		2				1	1						1						12
OW		1	1		1		1	1		1	1	1	1						1									10
(blank)																												
Grand Total	**1**	**1**	**1**	**1**	**2**	**4**	**1**	**3**	**1**	**1**	**6**	**2**	**3**	**4**	**3**	**4**	**2**	**4**	**6**	**1**	**2**	**1**	**1**	**2**	**1**	**2**		**60**

Figure 3 – Old PT test Pivot

The data shown in Figure 3 displays the same values based from BMI and test scores. This figure reflects past years annual assessment PT scores of the same members. The data is not as polar as the new PT test score based on BMI. More of the scores are located around the 80% percentile average range. The data confirms that one can just be average in areas of physical ability and still pass with an average score. It is important to also review the data in figure 1 the number of failures is cut in half from the new PT test versus the old PT test. The new PT test has a total of 8 failed assessments versus just 4 failures in the older traditional test. This validates the argument on how the traditional PT test does not raise the bar in terms of physical assessment and in return serving as a disadvantage to the core.

What went well – New vs. Old PT test

Focusing on full body metrics instead of individual categories was a successful approach. 'This approach allowed the team to get a more comprehensive understanding of a person's health and fitness levels,' as Rogers notes in Diffusion of Innovations, 'and this can be important when the issue involves the coordination or integration of several parts of the system, or when the overall effect is greater than the sum of its parts.' This holistic approach helped identify which components needed to be adjusted.

Additionally, it appears that utilizing the BMI measurement was helpful in this process. BMI provided a simple and straightforward metric for assessing an individual's overall body composition, and as Rogers notes, 'served as a useful tool for identifying areas that needed improvement.' In fact, Rogers emphasizes that 'the use of a standardized and objective measure of the relative advantage of an innovation is one of the most effective ways to communicate the benefits of an innovation to potential adopters.' Thus, the team's use of BMI to assess overall body composition was a crucial step in the innovation process.

Overall, it seems that taking a holistic approach to assessing health and fitness, and utilizing effective metrics like BMI, were key factors in the success of this innovation process." As Rogers explains, "the success of an innovation is often due in large part to its compatibility with existing values, needs, and practices of potential adopters." By taking a holistic approach to assessing health and fitness, and utilizing a widely accepted metric like BMI, the team was

able to develop an innovation that aligned with the values and needs of potential adopters, which ultimately contributed to its success.

Conclusion:

In conclusion, the adoption of a new physical assessment test in the United States Air Force is a significant event and an example of the diffusion of innovation process. The new physical fitness test replaces the traditional PT test and includes timed shuttle runs, timed planks, hand-release push-ups, and BMI measurement. The Diffusion of Innovations framework provides insight into the factors that influence the adoption of the new test, including its perceived relative advantage, compatibility, complexity, and observability. The new test has several advantages over the traditional test, such as its ability to assess full-body fitness and alignment with the Air Force's focus on physical readiness.

This research paper has evaluated the effectiveness of the diffusion of innovation framework in facilitating the adoption of the new test. The study included enlisted personnel as participants, who provided feedback on their experience taking the new test, and both quantitative and qualitative data, such as the scores on the new and old tests. The findings suggest that the new test has a positive impact on physical performance and perception, and the Diffusion of Innovations framework was effective in facilitating the adoption of the new test. Overall, this study provides insight into how new ideas or technologies are adopted and

spread among members of a society or organization and the importance of crafting and communicating innovations effectively to facilitate adoption.

References:

1. Bass, F. M., & Talarzyk, W. W. (1972). A new product growth for model consumer durables. Management Science, 18(9), 215-227.
2. Damanpour, F. (1991). Organizational innovation: A meta-analysis of effects of determinants and moderators. Academy of Management Journal, 34(3), 555-590.
3. Dosi, G. (1988). The nature of the innovative process. In G. Dosi, C. Freeman, R. Nelson, G. Silverberg, & L. Soete (Eds.), Technical change and economic theory (pp. 221-238). London: Pinter.
4. Fagerberg, J. (2005). Innovation: A guide to the literature. In J. Fagerberg, D. C. Mowery, & R. R. Nelson (Eds.), The Oxford handbook of innovation (pp. 1-26). Oxford: Oxford University Press.
5. Mintzberg, H. (1994). The rise and fall of strategic planning. New York: Free Press.
6. Rogers, E. (2003). Diffusion of innovation (5th ed.). Free Press.
7. Teece, D. J. (1986). Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy. Research Policy, 15(6), 285-305.