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# Late Responders to Online Self-Report U.S. Air Force Occupational Health Screenings

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Health screening surveys play a key role in understanding military personnel's perceived climate of their organization. These screenings provide participants with the opportunity to self-report on many aspects of their job and their personal well-being. Non-participation in these health screenings is of concern. The continuum of resistance model is one way to measure non-participation bias. Participants who answer a survey without additional reminders are thought to have little resistance to responding to the survey, and participants who need additional reminders, especially a final reminder email, are thought to have a higher resistance to responding to the survey. This study examines early, intermediate, and late responders on resistance behaviors, substantive survey results, and non-response bias for two samples. Online occupational health screenings were available to two U.S. Air Force wings for a 9-week period. Late responders showed higher rates of resistance behaviors and similar rates for quality of responses, burnout, and psychological distress. Reminder emails throughout the data collection effort were important to elicit a greater number of responses. However, responses recorded after the final reminder email resulted in similar outcomes, and the extra week of data collection did not change results for either sample.

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# 1.0 SUMMARY

Health screening surveys play a key role in understanding military personnel's perceived climate of their organization. These screenings provide participants with the opportunity to self-report on many aspects of their job and their personal well-being. Non-participation in these health screenings is of concern. The continuum of resistance model is one way to measure non-participation bias. Participants who answer a survey without additional reminders are thought to have little resistance to responding to the survey, and participants who need additional reminders, especially a final reminder email, are thought to have a higher resistance to responding to the survey. This study examines early, intermediate, and late responders on resistance behaviors, substantive survey results, and non-response bias for two samples. Online occupational health screenings were available to two U.S. Air Force wings for a 9-week period. Late responders showed higher rates of resistance behaviors and similar rates for quality of responses, burnout, and psychological distress. Reminder emails throughout the data collection effort were important to elicit a greater number of responses. However, responses recorded after the final reminder email resulted in similar outcomes, and the extra week of data collection did not change results for either sample.

# 2.0 INTRODUCTION

Health screening surveys play a key role in understanding military personnel's perceived climate of their organization. These screenings provide participants with the opportunity to self-report on many aspects of their job and their personal well-being. Results from these surveys are of interest to leadership to provide them with a comprehensive view of health within their organization, voiced directly from their subordinates. U.S. Air Force (USAF) organizations use these surveys to evaluate rates of military personnel burnout, psychological distress, post-traumatic stress disorder symptom expression, and other health-related outcomes; organizational stressors; job satisfaction, morale, and cohesion; and aspects of personal life stressors, work-family balance, and sleep-related issues [1-5]. With the comprehensive and yet anonymous participant nature of the health screening, and the direct and timely feedback provided to leadership in the form of operational briefings by the research team, leadership promotes participation in these research efforts in an attempt to fully understand feedback and well-being rates from their organization.

Non-participation in USAF occupational health screenings is of interest in the current study. While survey researchers intend to achieve results that are representative of the population of interest, achieving a 100% response rate is not practical, and not ideal. It is important to note that the occupational health screening surveys are online, using a non-government website. While most survey research is academic, literature on responses rates for online surveys, for both academic and organizational settings, reports acceptable response rates from 30-40% [6,7]. This seemingly low response rate is attributable to many factors inherent when employees are the intended population. These factors include work task commitments, available time to take the survey in the work day, and importance placed on the survey by leadership. Survey concerns, including anonymity, survey length, applicability to that potential participant, and if the participant believes his/her responses will add any value or that the conclusive results will be beneficial, are also factors. Additionally, the inundation of email messages in general and the number of email surveys embedded in those emails are an issue in many organizational settings

[8]. For all these reasons, a study's response rate may not reach the response rate the survey researcher has in mind by a set deadline, with the hopes of avoiding bias. At this point, the survey researcher has to decide to close the data collection window or send out reminders until a certain response rate is reached. While this is a dilemma for the researcher, many survey researchers have begun to question the assumption that low response rates result in biased outcomes [9]. In addition, attaining online survey response rates at 30-40% mentioned previously are unrealistic goals in a military setting. For example, the annual Total Force Climate Survey reported a 23% overall response rate in 2015.[1]

Bias occurs when a sample is not representative of a population of interest. One type of selection bias is non-response bias, or when those chosen for the sample are unwilling or unable to participate in the survey. The concern is that the non-participants are different from those who do respond to the survey in some systematic way, such as how they might answer survey items of interest (for example, burnout, low job satisfaction, or other health-related outcomes). One way to possibly reduce non-response bias during data analysis is to weight sample data based on normative data, such as demographic profiles of the U.S. Census, and then evaluate key variables by comparing the weighted and unweighted results. However, the amount of non-response bias in a study's results can be difficult to measure if the population of interest does not directly relate to national norms and their demographics, or occupational characteristics are not available. This is the case for USAF occupational health screenings. While manning numbers based on units are available for most mission areas, and personal demographics (gender, age, race, ethnicity) and occupational characteristics (Air Force Specialty Code, time in current duty position) are periodically updated based on the overall USAF, the norms may not be representative of subgroups. For example, the composition of a cyber unit may not be the same as the composition of a special operations unit.

Another method to measure non-response bias is based on the continuum of resistance model [10,11]. This is a relatively simple method for estimating the impact of non-participation on survey estimates. Participants who answer a survey without additional reminders are thought to have little resistance to responding to the survey. Individuals who do not engage in a survey until after receiving multiple reminders are termed late responders. It is reasonable to expect that late responders will display more resistance to completing the survey. Resistance behaviors may include opening the survey only to then exit after reading the consent form or exiting the survey early, such as in an introductory section. Another consideration is that late responders will not provide quality responses or will rush through the survey.

The continuum of resistance model suggests that late respondents can be used as a proxy for those who chose not to engage in the study at all (non-respondents) [11-14]. These late respondents are defined as individuals who were given multiple reminders to respond, and a considerable amount of time in the response collection window has elapsed before a response. These individuals would be in the non-respondents group if follow-up reminders had not been sent. With the understanding that the USAF organizations in the current study are highly tasked and have shift-working schedules, a third group of intermediate responders was added to the study to account for individuals who may have not responded immediately, but still showed little resistance to responding after a reminder email or two. This is with the belief that intermediate responders are in the intermediate responders group because of work-related factors (such as

[1] U.S. Air Force. 2015 total force climate survey results. 2015. [Accessed 24 Apr 2018]. Available from https://www.my.af.mil/gcss-af/USAF/ep/browse.do?programId= t330D98A149CA5AFC0149D307BCBB01D6&channelPageId=sE3494DD04562FCC901456BE0545C017A to those with access.

high workload) that may hinder earlier participation. These hypotheses are based on previous literature showing high self-reported rates of high stress related to workload and additional work duties [1,4]. Differences in results between early to intermediate responders and late responders may suggest a difference of results between early to intermediate responders and non-respondents.

The purpose of this study was to understand the impact of response timing on resistance behaviors, substantive survey results/data quality, and therefore non-response bias. The current study included two samples that were given 8-week data collection windows, but were open one additional week to attain a goal response rate in the 30-40% range. The first sample, Sample A, reached a response rate of 42%, while the second sample, Sample B, did not reach the goal, with a response rate of 20%. The same hypotheses for Sample A and Sample B are listed, regardless of response rate.

It was hypothesized that late responders will exhibit higher rates of resistance behaviors: (a1) indicate "Do not wish to participate in the survey" on the consent form, and (a2) if they began the survey, exited the survey in the demographic sequence (first sequence).

However, as this was an initial study, we did not have directional hypotheses for quality of responses. These quality of response hypotheses were measured by (b1) time in survey, (b2) early exit of the survey, after the demographics sequence, (b3) non-differentiation of standardized scales, and (b4) written-in response to open response items.

Finally, we also examined the rates of (c1) high exhaustion, (c2) high cynicism, (c3) low professional efficacy, (c4) high psychological distress, and (c5) low job satisfaction, three of the measures of interest in operational briefings and associated deliverables for each of the occupational health screenings. This was to determine if late responders tend to report at lower or higher rates of these health outcomes when compared to early and intermediate responders. Therefore, while we hypothesized that late responders will display more resistance behaviors than early or even intermediate responders, we examined if (d1) evidence of non-response bias based on the continuum of resistance model will be found in the current study.

# 3.0 METHODS

## 3.1 Participants

Participants included personnel from two operational wings in the 25$^{th}$ Air Force (Sample A and Sample B) who initiated an occupational health survey in a 9-week period in 2016. Participants were mainly active duty males, with 24 months or less in their current duty positions for both samples. Demographics are shown in Table 1 for Sample A and Table 2 for Sample B. Data regarding the ethnicity or race of participants were not available. Response rate was estimated at 42% for Sample A and 20% for Sample B.

## 3.2 Questionnaire

The first part of the occupational health screening included demographic items that assessed respondents' gender, age range, marital status, and number of dependents living at home. This section also contained operational items that assessed unit of assignment, duty position, rank range, length of time serving in current position, average number of hours worked in a typical week, and current work schedule. This section of the questionnaire was designed so

that no identifiable personal information was obtained to maintain anonymity for respondents. This was done to encourage genuine self-disclosure in a community where there may be strong cultural stigmas (and concerns for negative career implications) regarding the self-reporting of medical or mental health problems.

**Table 1. Sample A Demographics and Results**

| Sample A | Total n | Response Timing Group | | | Significance *$p < 0.05$ |
|---|---|---|---|---|---|
| | | Early n (%) | Intermediate n (%) | Late n (%) | |
| Original dataset | 2464 | 1584 (64.29) | 830 (33.69) | 50 (2.03) | |
| **Resistance** | | | | | |
| I do not wish to participate (a1) | 59 | 41 (2.59) | 18 (2.17) | 0 (0.00) | ns |
| Exited survey in demographics (a2) | 231 | 80 (5.05) | 43 (5.18) | 27 (54.00) *3 duplicates* | CA, CB |
| Cleaned dataset | 2252 | 1463 (64.96) | 769 (34.15) | 20 (0.89) | |
| **Demographics** | | | | | |
| Male | | 1070 (73.54) | 556 (72.68) | 16 (80.00) | ns |
| 18-25 yr | | 452 (31.00) | 232 (30.21) | 6 (30.00) | ns |
| 26-35 yr | | 722 (49.52) | 415 (54.04) | 11 (55.00) | ns |
| 36+ yr | | 284 (19.48) | 121 (15.76) | 3 (15.00) | ns |
| Active duty | | 1405 (96.17) | 747 (97.14) | 19 (95.00) | ns |
| Time in duties: 24 mo or less | | 1101 (76.41) | 589 (78.43) | 13 (68.42) | ns |
| **Quality of Responses** | | | | | |
| Time in survey, min (b1) (median) | | 38 | 28 | 36 | |
| Early exit of the survey (b2) | | 393 (26.86) | 262 (34.07) | 4 (20.00) | ns |
| Non-differentiation MBI (b3a) | | 52/1249 (4.16) | 25/615 (4.07) | 0/16 (0.00) | ns |
| Non-differentiation OQ45 (b3b) | | 80/1230 (6.50) | 17/601 (2.83) | 1/16 (6.25) | ns |
| Skipped open response items (b4) | | 777 (53.11) | 416 (54.10) | 8 (40.00) | ns |
| **Rate of Occupational Health Thresholds** | | | | | |
| Burnout: | | | | | |
| High exhaustion (c1) | | 341/1246 (27.37) | 158/613 (25.77) | 5/16 (31.25) | ns |
| High cynicism (c2) | | 272/1227 (22.17) | 133/600 (22.17) | 5/16 (31.25) | ns |
| Low professional efficacy (c3) | | 94/1227 (7.66) | 42/599 (7.01) | 1/16 (6.25) | ns |
| Psychological distress: | | | | | |
| High psychological distress (c4) | | 208/1193 (17.44) | 102/577 (17.68) | 4/16 (25.00) | ns |
| Job satisfaction: | | | | | |
| Low job satisfaction (c5) | | 190/1337 (14.21) | 91/673 (13.52) | 2/16 (11.11) | ns |

*Note.* Date ranges for timing groups: Early: 3/1/16-3/21/16 (prior to first reminder email); Intermediate: 3/22/16-4/25/16 (after first reminder email but prior to final reminder email); Late: 4/26/2016-5/3/2016 (after final reminder email). Estimated response rate for Sample A was 45%. Three duplicate cases were identified in data cleaning, where the initial response was in a prior timing group; these individuals were removed from the late timing group. A = Early, B = Intermediate, C = Late response groups.

**Table 2. Sample B Demographics and Results**

| Sample B | Total n | Response Timing Group | | | Significance *$p < 0.05$ |
|---|---|---|---|---|---|
| | | Early n (%) | Intermediate n (%) | Late n (%) | |
| Original dataset | 1468 | 394 (26.84) | 1005 (68.46) | 69 (4.70) | |
| **Resistance** | | | | | |
| I do not wish to participate (a1) | | 4 (1.02) | 52 (5.17) | 7 (10.14) | CA, BA |
| Exited survey in demographics (a2) | | 100 (25.38) | 200 (19.90) | 23 (33.33) | CB |
| Cleaned dataset | 1082 | 290 (26.80) | 753 (69.59) | 39 (3.60) | |
| **Demographics** | | | | | |
| Male | | 190 (66.20) | 591 (78.91) | 27 (69.23) | BA |
| 18-25 yr | | 61 (21.03) | 204 (27.20) | 5 (12.82) | ns |
| 26-35 yr | | 161 (55.52) | 385 (51.33) | 23 (58.97) | ns |
| 36+ yr | | 68 (23.45) | 161 (21.47) | 11 (28.21) | ns |
| Active duty | | 286 (98.62) | 742 (98.54) | 39 (100.0) | ns |
| Time in duties: 24 mo or less | | 228 (78.89) | 592 (78.83) | 30 (76.92) | ns |
| **Quality of Responses** | | | | | |
| Time in survey, min (b1) (median) | | 38 | 33 | 35 | ns |
| Early exit of the survey (b2) | | 55 (18.97) | 123 (16.33) | 3 (7.69) | ns |
| Non-differentiation MBI (b3a) | | 12/273 (4.40) | 35/731 (4.79) | 2/39 (5.13) | ns |
| Non-differentiation OQ45 (b3b) | | 19/266 (7.14) | 71/719 (9.87) | 2/38 (5.26) | ns |
| Skipped open response items (b4) | | 145 (50.00) | 398 (52.86) | 20 (51.28) | ns |
| **Rate of Occupational Health Thresholds** | | | | | |
| Burnout: | | | | | |
| High exhaustion (c1) | | 93/273 (34.07) | 169/730 (23.15) | 7/39 (17.95) | AB |
| High cynicism (c2) | | 74/269 (27.51) | 137/718 (19.08) | 9/38 (23.68) | AB |
| Low professional efficacy (c3) | | 19/269 (7.06) | 65/719 (9.04) | 3/38 (7.89) | ns |
| Psychological distress: | | | | | |
| High psychological distress (c4) | | 43/256 (16.80) | 97/686 (14.14) | 6/37 (16.22) | ns |
| Job satisfaction: | | | | | |
| Low job satisfaction (c5) | | 75/289 (25.95) | 155/751 (20.64) | 12/39 (30.77) | ns |

*Note.* Date ranges for timing groups: Early: 2/26/16-3/22/16 (prior to first reminder email); Intermediate: 3/23/16-4/26/16 (after first reminder email but prior to final reminder email); Late: 4/27/2016-5/3/2016 (after final reminder email). Estimated response rate for wing B was 20%. One duplicate was found in the dataset. Both entries were in the early response group; incomplete record was removed and complete record remained in cleaned dataset. A = Early, B = Intermediate, C = Late response groups.

**3.2.1 Maslach Burnout Inventory (MBI).** The MBI is a 16-item self-report scale that assesses exhaustion (e.g., "I feel burned out from my work"), cynicism (e.g., "I have become less enthusiastic about my work"), and professional efficacy (e.g., "I can effectively solve the problems that arise in my work"), which coincide with the three facets of burnout [15]. Each item is rated on a 7-point scale that assesses the frequency with which the respondent experiences each statement. Item scores range from 0 (never) to 6 (daily). The exhaustion and cynicism subscales have five items each, whereas the professional efficacy subscale consists of six items. Cutoff scores for each subscale have been established: 20 or higher for the exhaustion and cynicism scales and 12 or lower for the professional efficacy subscale. Construct validity of the MBI has been established, and stability coefficients range from 0.65 to 0.67 [15].

**3.2.2 Outcome Questionnaire (OQ-45.2).** The OQ-45.2 is a self-report instrument assessing symptoms of psychological distress over the last week, including difficulties in interpersonal relationships, social roles, and overall quality of life. The instrument consists of 45 items, all of which are based on a 5-point Likert-type scale with the values of 0 (never) to 4 (almost always). Several items are reverse-scored to reduce random responding. The total score on the OQ-45.2

ranges from 0 to 180, with higher scores representing higher levels of psychological distress. A total score of 63 or more may be considered indicative of high levels of distress. Concurrent validity estimates for the total score range exceed $r > 0.80$, and test-retest reliability and internal consistency values range from 0.84 to 0.93 [16]. The OQ-45.2 is commonly used at mental health clinics on USAF installations to assess psychological distress and track progress among USAF personnel seeking mental health care.

**3.2.3 Job Satisfaction.** Job satisfaction was measured by one item—"Overall, how satisfied are you with your job?"—on an 11-point scale of 0 (not at all satisfied) to 10 (extremely satisfied). A dichotomous low job satisfaction variable was created, with 0-3 indicating low job satisfaction.

### 3.3 Procedure

USAF leadership from each wing sent an invitation to complete the occupational health survey via mass email to all personnel within their wing. The email explained the purpose of the study and confidentiality safeguards, and interested participants were then directed to a secure website to complete the study. It was also clearly communicated to participants that no identifiable personal information was obtained, they could withdraw at any time without negative repercussions, the survey was issued and data were held by independent researchers, and line leadership would not have access to individual data at any time. The group email invitation to participate had an internet link to the USAF School of Aerospace Medicine web-based survey. The two wings had separate links to identical surveys. Participants were also instructed on local resources and points of contact for obtaining mental health care, at their discretion.

Before participants could begin the electronic survey, they were asked if they understood the nature, purpose, and instructions of the survey and were voluntarily consenting to participate. Those who endorsed "yes" were then allowed to proceed and take the survey. Those who endorsed "no" were not given the survey and were redirected to another web page that instructed them how to contact the independent researchers of the study for additional information. The number and proportion of individuals declining participation are shown in Table 1.

Each survey was open for a 9-week period. Reminder emails to elicit greater participation in surveys were sent from the survey researcher to the wing leadership, and wing leadership forwarded the email to all personnel within their wing. The first reminder email was sent at 21 days after the survey was open, and subsequent reminder emails were sent on a weekly basis, with the final reminder sent approximately a week before the survey was closed (see Figures 1 and 2). Previous similar occupational health screenings were open for a 6- to 8-week period.

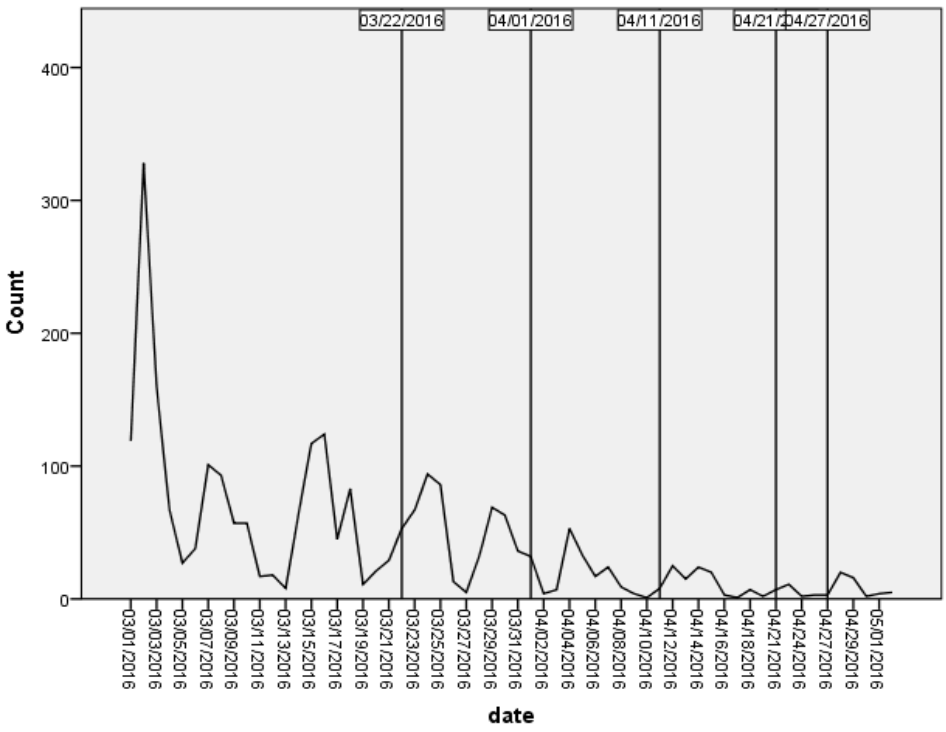


**Figure 1. Sample A response frequency by date.** Reference lines indicate survey reminder sent dates.

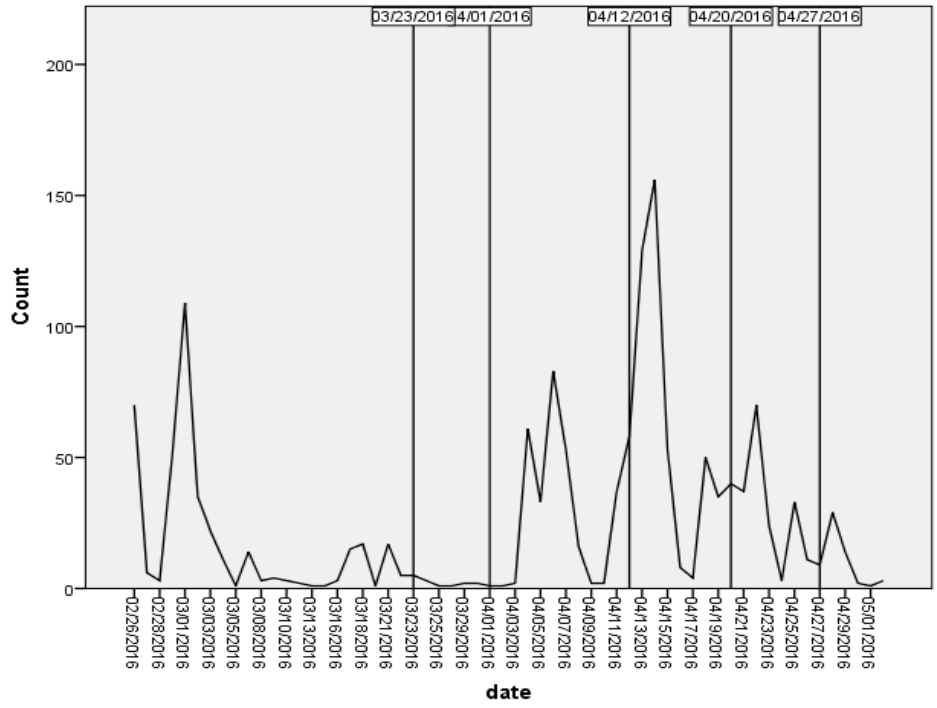


**Figure 2. Sample B response frequency by date.** Reference lines indicate survey reminder sent dates.

### 3.4 Data Analysis

In this study we conducted two sets of cross-sectional (involving data from a single web-survey) analyses. Participants were categorized into three "response time" groups (early, intermediate, and late). Early responders initiated the survey before the first reminder was sent out (in the first 3 weeks), intermediate responders initiated the survey after the first reminder was sent out but before the final reminder was sent (week 4 to week 8), and late responders completed the survey after the final email reminder was sent out (week 9). It is important to note that the final reminder email stated that it was a final reminder to participate in the survey. Lindner, Murphy, and Briers (p. 52) argue that late respondents should be those who respond to the last wave of contact, granted this last wave consists of more than 30 responses [14]. Both Sample A and Sample B met the minimum n requirement for the late responders group.

Independent proportion comparisons with a correction for multiple comparisons were conducted to examine differences among the three groups (early, intermediate, and late) of responders for each of the hypotheses listed.

**3.4.1 Resistance.** Resistance hypotheses were tested based on the final dataset download, prior to data cleaning. A frequency was run for consent form response.

(a1) Those who indicated they did not wish to participate in the survey were recorded.
(a2) Individuals who exited the survey in the demographics sequence were tallied and recorded.

**3.4.2 Quality of Responses.** All additional hypotheses were based on the n of the cleaned dataset (see Table 1). Individuals who indicated they did not wish to participate in the survey or exited the survey in the demographics sequence were removed from the dataset. Additional cleaning procedures for this study included removing duplicate cases.

(b1) Time in survey was determined by subtracting the start time from the end time, and the median was reported. The mean was not appropriate in this instance because of extreme outliers.
(b2) Early exit was determined by dividing the number of individuals who exited the survey before completion by the number in the timing response group. The numerator was determined by those who responded to either the second to last or third to last item in the survey. The last item was not chosen because it began with an "If" statement, and therefore not all of those reading the item would respond.
(b3) Non-differentiation of scales was determined by individuals selecting the same answer choice/anchor for the MBI or OQ-45.2. The number of individuals with 11 to 16 instances of a response for MBI, or 37 to 45 instances of a response for OQ-45.2, was indicative of non-differentiation. These cutoffs were chosen because 6 of the MBI items were positively worded on a negatively worded questionnaire and 9 of the OQ items were negatively worded on a positively worded questionnaire. Non-differentiating, or having the same answer choice or anchor, indicates that the individual was not reading the items.

(b4) Non-response to open response items was determined by the number of individuals giving no response to the first open response in the screener, with the rationale that these individuals would be less likely to respond to open response items later in the survey. Any response, including "n/a, no comment, no issues," was included as a response.

**3.4.3 Rates of Occupational Health Screeners.** Frequencies were run of the dichotomous threshold variables for high exhaustion, high cynicism, low professional efficacy, high psychological distress, and low job satisfaction (c1-5).

# 4.0 RESULTS

## 4.1 Sample A

Sixty-four percent of Sample A were early responders, 34% were intermediate, and 2% were late responders. Late responders were more likely to show one of the resistance behaviors, with 54% of late responders exiting the survey in the first sequence of the occupational health screening as compared to 5% of early and intermediate responders (a2). However, no late responders showed (a1) the first resistance behavior, opening the survey and then declining participation at the consent form. After data cleaning, the demographics were similar among the three groups, and the proportion comparisons measuring a difference among the groups were not significant for quality of responses (b1-b3) and the rates of occupational health thresholds (c1-c4).

## 4.2 Sample B

Twenty-seven percent of Sample B were early responders, 68% were intermediate, and 5% were late responders. A larger proportion of late responders exited the survey in the demographics sequence (33.33%) compared to 19.90% of intermediate responders and chose not to submit the consent form altogether (10.14% of late responders compared to 1.02% of early responders). However, results were inconsistent in that proportion comparisons were not significant when comparing each of the earlier response groups with late responders. The demographics among the three response timing groups were similar, as well as the measures of quality of responses. Rates of low professional efficacy, high psychological distress, and low job satisfaction were similar among the three response timing groups. However, differences among the groups were found for high exhaustion and high cynicism (c1-c2). Early responders reported high exhaustion and high cynicism at higher rates than late responders. This indicates that a direction of bias is apparent, with early responders inflating the rates of these burnout subscale thresholds.

## 5.0 DISCUSSION

USAF organizational health screenings provide military survey researchers with important information whether or not the response rate reaches the desired level stipulated by academic research. If the sample is representative of the intended population, the researcher can be confident of results, but if the sample is subpar, and therefore has a low response rate, the survey may still provide many important pieces of information in the form of responses to write-in items. Additionally, it may be reassuring to leadership to see that their reminder emails to participate do, in fact, garner additional responses, and these responses are quality responses (see Figures 1 and 2 for number of responses by time, with reminder email dates).

As hypothesized, late responders displayed resistance behaviors at a higher rate than early or intermediate responders. With the reasoning that these individuals are more like non-respondents than early responders, an interesting finding was presented with Sample B. Early responders displayed higher rates of high exhaustion and high cynicism than late responders. With Sample B having a response rate of 20%, it is possible that a better response rate would result in increasing the denominator for the MBI sequence and then decreasing the rate of individuals meeting the thresholds. This would imply that early responders negatively inflate rates of stress thresholds that may not be representative of the population. However, another explanation for the possibility of biased results for Sample B was offered post-survey collection by leadership. This explanation is that Sample B was experiencing survey overload and had been tasked recently with two additional surveys. This can explain the lower percentages of participants in the early response group (27% compared to 64% in the early response group for Sample A) and the higher rates of exhaustion and cynicism reflected in the early response group. Given the results from the current study, researchers can be cautiously optimistic of the stability of results on key variables. When presenting results on a study with a low response rate, or a skewed distribution of responses based on timing, a suggestion is to provide a range for a key statistic, to give the overall high exhaustion percentage, then also provide a reference line at 17.95% (late responders) and 34.07% (early responders) to show the variability in responses based on time (see Table 2).

It is cautiously reassuring that no differences were found among the groups when assessing for demographics or quality of responses to the survey. Bias can result when there are demographic differences among the groups, and proportions of participants in each age range remained consistent. Gender (males), time in current duties (24 months or less), and military affiliation (active duty) were also consistent, but were a majority; therefore, no variance was presented in these demographics for evaluation of bias. Participants took approximately 28-38 minutes overall to complete the survey, and rates of non-differentiation were at acceptable levels for health outcome measures. Overall, the high proportion of individuals skipping open response items may be a formatting consideration when designing future occupational health screenings.

## 6.0 STRENGTHS AND LIMITATIONS OF THE STUDY

Self-report questionnaires can be prone to response bias due to the voluntary nature of the sample, which might affect the ability to generalize results. This sampling bias may manifest in the sample through respondents who are at extreme ends of risk and who want to communicate their concerns. This may have been an issue with early responders in Sample B. However, this type of sampling bias can actually render positive rather than negative impact on results because of its ability to highlight risk and thereby aid leadership and medical providers in understanding and identifying the intended at-risk population. Additionally, since obtaining health behavior data on intelligence personnel can be relatively difficult, efforts that maximize self-disclosure, like this anonymous, self-reporting survey methodology, can facilitate garnering far more accurate data and "true prevalence" rates of specific behavioral health behaviors and related conditions as opposed to analyzing medical records and encounters of intelligence personnel, which may not provide an accurate "picture" of the issues within this community.

It is important to note that perceived leadership support of the survey efforts was similar for the two wings. The timing of the survey collection effort was a limitation already discussed for Sample B; however, this is a limitation that researchers and leadership can avoid in future iterations of the screening by open communication by leadership of other survey efforts placed on their organizations.

## 7.0 CONCLUSIONS

While late responders in both samples displayed more resistance behaviors than early or intermediate responders, quality of data, including substantive data, and rates of occupational measures were similar overall across the response timing groups. These findings support the theory that late responders will have more resistance than early responders; however, it does not affect quality of responses of those who engaged in the survey after completing the demographics (or introductory) section. Reminder emails were important to elicit a greater number of responses throughout the data collection period. However, both samples had data collection windows that remained open an extra week with the goal of reaching a higher number of responses, and therefore a higher response rate, but the results would have been similar had the data collection window closed a week earlier.

## 8.0 REFERENCES


1. Prince L, Chappelle W, McDonald K, Goodman T. Main sources of occupational stress and symptoms of burnout, clinical distress, and post-traumatic stress among distributed common ground system intelligence exploitation operators (2011 USAFSAM survey results). Wright-Patterson AFB (OH): U.S. Air Force School of Aerospace Medicine; 2012. Technical Report AFRL-SA-WP-TR-2012-0010.
2. Chappelle W, Prince L, Goodman T, Thompson W, Cowper S, Ray-Sannerud B. Occupational health screenings of the virtual warrior: distributed common ground system intelligence operators compared with non-combatant support personnel. Wright-Patterson AFB (OH): U.S. Air Force School of Aerospace Medicine; 2014. Technical Report AFRL-SA-WP-TR-2014-0003.

3. Prince L, Chappelle WL, McDonald KD, Goodman T, Cowper S, Thompson W. Reassessment of psychological distress and post-traumatic stress disorder in United States Air Force Distributed Common Ground System operators. Mil Med. 2015; 180(3 Suppl):171-178.
4. Chappelle W, Goodman T, Thompson W, Prince L. 2016 occupational health stress screening & reassessment. 480th ISRW Executive Brief, Global Synch and Planning Meeting; 2016 May 16; Langley AFB, VA.
5. Prince L, Goodman T, Mosley S, Chappelle W, Thompson W. Reassessment of self-reported behavioral health habits and other health issues among distributed common ground system intelligence operators and non-combatant support personnel. Wright-Patterson AFB (OH): U.S. Air Force School of Aerospace Medicine; 2017. Technical Report AFRL-SA-WP-TR-2017-0021.
6. Baruch Y, Holtom BC. Survey response rate levels and trends in organizational research. Human Relations. 2008; 61(8):1139-1160.
7. Nulty DD. The adequacy of response rates to online and paper surveys: what can be done? Assess Eval High Educ. 2008; 33(3):301-314.
8. Weiner SP, Dalessio AT. Oversurveying: causes, consequences, and cures. In: Kraut AI, ed. Getting action from organizational surveys: new concepts, methods and applications. San Francisco (CA): Jossey-Bass; 2006:294-311.
9. Peytchev A. Consequences of survey nonresponse. Ann Am Acad Pol Soc Sci. 2013; 645(1):88-111.
10. Filion FL. Exploring and correcting for nonresponse bias using follow-ups of nonrespondents. Pac Sociol Rev. 1976; 19(3):401-408.
11. Fitzgerald R, Fuller L. I hear you knocking but you can't come in: the effects of reluctant respondents and refusers on sample survey estimates. Sociol Methods Res. 1982; 11(1):3-32.
12. Kypri K, Stephenson S, Langley J. Assessment of nonresponse bias in an internet survey of alcohol use. Alcohol Clin Exp Res. 2004; 28(4):630-634.
13. Lin IF, Schaeffer NC. Using survey participants to estimate the impact of nonparticipation. Public Opin Q. 1995; 59(2):236-258.
14. Lindner JR, Murphy TH, Briers GE. Handling nonresponse in social science research. J Agric Educ. 2001; 42(4):43-53.
15. Maslach C, Jackson SE, Leiter MP. Maslach burnout inventory, 3rd ed. Palo Alto (CA): Consulting Psychologists Press; 1996.
16. Lambert MJ, Burlingame, GM, Umphress V, Hansen NB, Vermeersch DA, et al. The reliability and validity of the Outcome Questionnaire. Clin Psychol Psychother. 1996; 3(4):249-258.

# LIST OF ABBREVIATIONS AND ACRONYMS

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| **MBI** | Maslach Burnout Inventory |
| **OQ** | Outcome Questionnaire |
| **USAF** | U.S. Air Force |