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The Relationship Between Intensity of Fitness Tracker Usage and Motivation

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Abstract

Many college students engage in unhealthy behaviors which may contribute to diseases. Additionally, some students may lack motivation to rectify these behaviors to improve their long-term health. This study assessed the relationship between intensity of fitness tracker usage and motivation among health professions students at a large, public Midwestern university. This non-experimental, correlational study used convenience sampling and a theoretical framework based on Bandura's Social Cognitive Theory. Online recruitment announcements were emailed and included links to the consent form and survey. Motivation was measured with Deci and Ryan's modified self-determination tool. Intensity of tracker usage was measured using a scale of questions regarding various tracker functions. The data was analyzed with Pearson's coefficient correlations and no significant relationships between intensity of tracker usage and (a) intrinsic motivation, (b) extrinsic motivation, and (c) prosocial behaviors were found.

The Relationship Between Intensity of Fitness Trackers Usage and Motivation

Research shows that the majority of college aged students consistently engage in unhealthy behaviors and do not meet the Centers for Disease Control and Prevention (CDC) guidelines for physical activity (Kinney, 2017). These unhealthy behaviors include regular cigarette smoking, alcohol binge drinking, poor eating habits, and insufficient or ineffective physical activity. This is a significant issue because, according to the National Center of Education Statistics, there are a projected 19.9 million college students in the United States, and this number is expected to increase to 20.5 million by 2057 (NCES, 2018). Habits of unhealthy behaviors that develop in young adulthood contribute to heightened risk of chronic illness and disease in later adulthood (McCracken, Jiles, & Blanck, 2007). According to the CDC these chronic illnesses increase health care costs and account for 90% of the nation's total health care expenditures (CDC, 2018). Heart disease and stroke alone cost the country approximately $190 billion dollars yearly (CDC, 2018). These findings support the need for interventions during the transition from adolescence to adulthood to promote the development of healthy behaviors, which then may decrease the incidence of chronic illness and disease later in adulthood. It has also been shown that developing healthier habits earlier in life increases the chance that these habits will continue throughout adulthood (McCracken et al., 2003). Thus, it is important to study the ways in which young adults are motivated to form healthy habits.

Motivation is a key factor in developing healthy habits throughout life (Bennet et al., 2017). However, motivation is multifaceted and tends to vary from person to person. For example, an individual's health locus of control, or their perception of how much control they have over their own health, can impact their habits (Bennet, 2017). This perception of control also impacts an individual's willingness to utilize interventions that can change their health, such as the usage of wearable fitness trackers (WFTs) (Bennet, 2017). Furthermore, motivation can be

either intrinsic or extrinsic in nature. Motivation that originates internally or intrinsically has been shown to correlate with an increased willingness to alter health habits, while motivation that is driven by external factors has resulted in more complacency in routine (Asimakopoulos, Asimakopoulos, & Spillers, 2017). Thus, it is important to determine the health locus of control when studying habits of healthy behaviors. Knowing motivation influences what type of health habits individuals may develop is a major rationale for analyzing the relationship between motivation and fitness tracker usage.

The present digitalized age is changing how we view health and healthy habits. Researchers continue to study the outcomes of tracking physical health and developing routines. Thus, digital ways to keep track of these have increasingly been marketed to consumers. There are many different types of electronic fitness trackers, the most popular being the *FitBit*®, the *Garmin*®, and the *Apple Watch*® (Maher, Ryan, Ambrosi, & Edeny 2017). These monitor sleep patterns, heart rate, water intake, diet, physical activity, steps taken, and much more. The benefit of electronic fitness trackers is that they provide users with instant feedback about physical status, which can increase the wearers' awareness and therefore motivation to continue or increase their physical activity (Kinney, 2017).As the popularity of electronic fitness monitors has increased, ways to share personal data on social media have been added to increase perceived motivation, social interaction, and social comparison in order to create a competitive atmosphere among users (Maher et al., 2017). Due to a projected increase in usage of electronic fitness monitors, researchers should be prompted to further investigate the effectiveness in usage of the wearable technology and personal motivation for healthy habits and physical activity (Kinney, 2017).

The purpose of this honors project is to analyze the relationship between intensity of fitness tracker usage and motivation in adult students in a *College of Health Professions*. The project answered the following research question: Are motivation and intensity of fitness tracker usage correlated in *College of Health Professions* students? More specifically, is there a relationship between intrinsic, extrinsic, or prosocial motivation and the usage of fitness trackers? The degree to which intensity of usage, intrinsic motivation, extrinsic motivation, and prosocial motivation are related could help to shed light on how trackers can be utilized most effectively based on individual motivation. This information may be valuable in promoting health and enhancing the use of fitness trackers in college-aged adults. Because of the increasingly unhealthy behaviors of college aged students, it is imperative to identify ways to combat these behaviors to promote long term health. The current literature was reviewed, and it was noted that many studies do not focus on young adults and how their decisions regarding their health will impact them later on in life. Electronic fitness trackers are potentially one intervention that can be implemented during this stage of life to establish health maintenance routines.

Review of Literature

Motivation

Motivation can be influenced by several factors and plays a major role in overall health and fitness (Asimakopoulos et al., 2017). To examine how motivation relates to fitness tracker usage, it is important to understand different factors of motivation. One factor that influences motivation is an individual's health locus of control. The health locus of control dictates the amount of control that individuals believe that they have over their own health. In a non-experimental cross-sectional study (N=277), Bennet (2017) examined to what extent personal health locus of control can predict willingness to use mobile health apps and WFTs. In the

research, Bennet (2017) used the Multidimensional Health Locus of Control tool which differentiates between three main loci of control: internal, powerful other, and chance. Individuals with an internal locus of control believed that they had control over their own health (Bennet, 2017). The results of this study showed that individuals with a higher internal locus of control were positively correlated with a willingness to use fitness apps and WFTs.

Another aspect related to motivation is the effect of self-determination on WFT usage. Asimakopoulos et al. (2017) found that users who had a higher self-determination incorporated other personal wellness tools in addition to WFTs into their routines. The self-determination theory guided distinctions between intrinsic and extrinsic motivation. Intrinsic motivation stems from internal cues, while extrinsic motivation is prompted by an external reward. According to the self-determination theory, intrinsic motivation is heightened by autonomy, competence, and psychological relatedness (Asimakopoulos et al., 2017). Researchers found that the majority of participants reported that usage of fitness tracking devices and applications was useful in enhancing their motivation and willingness to change fitness habits (Asimakopoulos et al., 2017).

Wearable Fitness Trackers

Motivation is an important factor in an individual's pursuit of personal health (Asimakopoulos et al., 2017). In order for a person to be able to change their motivation and their habits, they need to be aware of their actions (Kinney, 2017). It is this personal motivation and self-awareness that the utilization of fitness trackers supports. Fitness trackers are built to create or enhance personal motivation for a healthy lifestyle and regular fitness routine (Jakicic & Belle, 2017). Electronic fitness trackers are marketed as motivators and the popular belief is that they are a source of health motivation.

Researchers at the University of South Australia conducted a study (N=237) on user experience of WFTs and examined motivation and behavior change related to the use of WFTs (Maher et al., 2017). Of the individuals that were studied, the vast majority reported an increase in motivation and physical activity since implementing the WFT. Overall, users were motivated to track and improve activity patterns, fitness, and health based upon their usage of the WFTs (Maher et al., 2017).

While trackers are an important factor in motivation of fitness and health, sustained and consistent use of them is also a large determinant in the perceived success of the device. According to Hermsen, Moons, Kerkhof, Wiekens, & Groot (2017), age is the leading predictor of long-term WFT. Young adult users have more sustained tracker usage, and consistent WFT usage continues 80% longer than the utilization of a phone application. (Hermsen et al., 2017). Sustained or not, tracker usage may be directly correlated to the maintenance of a fitness routine and motivation to do so.

Theoretical Framework

According to Bandura's Social Cognitive Theory (SCT), self-efficacy is one's confidence in their ability to achieve tasks to be successful in various endeavors (Bandura, 2001). Self-efficacy is a person's belief about their capabilities. Based on Bandura's SCT, persons with higher task-specific self-efficacy about physical exercise will have a better chance of attempting and accomplishing exercise-related goals. As Bandura explains, self-efficacy impacts activity choices, effort of intensity performing a task, and persistence when facing obstacles (Bandura, 1997). According to this theory, self-efficacy can come from mastery experiences, social modeling, social persuasion, and psychological perspectives and can either be high or low (Bandura, 1997). Therefore, self-efficacy is affected by social interaction and social learning.

Furthermore, Bandura states that in order for a person to be able to change their motivation and their behaviors, they need to be aware of their actions (Bandura, 2001). This is why it is anticipated that intensity of WFT usage will directly correlate with motivation. The WFT makes the user aware of personal daily fitness and allows users to establish goals (Crawford, Lingel, & Karppi, 2015). WFTs can track goals on an hourly, daily, or weekly basis. Bandura's SCT includes self-regulation and self-reflection, thus when goals are tracked by WFTs, users are implementing personal cognitive factors (Bandura, 2001). WFTs notify users of goal accomplishments by fireworks, smiley faces, thumbs up, buzzing, and other motivational graphics (Crawford et al., 2017). The motivational graphics allow users to be aware of their actions, thus increasing self-efficacy (Bandura, 1997).

As previously stated, Bandura explains how positive previous experiences increase self-efficacy (Bandura, 1997). For example, accomplishing daily step goals would increase an individual's self-efficacy. The SCT suggests that the degree of self-efficacy influences motivation and, in the case of this study, may be correlated with higher usage of fitness trackers in college students (Bandura, 1997). In addition, a higher self-efficacy has been proven to correlate with increased usage of mobile health apps (Kinney, 2018).

In this study, motivation will be a proxy for an aspect of self-efficacy. Self-efficacy is the belief that an individual is capable of carrying out a certain task (Seifert & Sutton, 2018). However, according to Mimi Bong and Einar Skaalvik, self-efficacy and self-concept influence motivation. The influence on motivation is personally constructed and self-developed (as cited by Seifert & Sutton, 2018). This relates to fitness trackers because if individuals' self-efficacy is higher, they may be more motivated to participate in exercise-related activities and thus use fitness trackers at a higher intensity. Personal motivation is subjective and varies greatly across a

sample, making it a difficult variable to measure. Regardless of the challenges in measuring personal motivation, it is evident that a healthy lifestyle is marked by a self-report of high motivation (Maher et al., 2017).

Bandura's SCT was used to guide this study in which the researchers asked *College of Health Professions* students at a large urban public university questions about their intensity of tracker usage and motivation. More so, to measure motivation as a proxy of self-efficacy, students were asked if they believe that they can accomplish their goals, and this self-rated subjective data was recorded. The expected outcome based on the theoretical framework is that students with higher intensity of fitness tracker use are more likely to have higher intrinsic, but not necessarily extrinsic motivation. Therefore, the following is hypothesized: Tracker utilization intensity will be positively correlated with motivation. It is additionally hypothesized that intrinsic motivation and prosocial behaviors will be positively correlated with tracker usage and that extrinsic motivation will be negatively correlated with tracker usage.

Methods

Design

This research was a non-experimental correlational study. The participants were only surveyed once, thus making it a cross-sectional study. The study took place via online recruitment and survey data collection. Students were only be able to submit one response but received multiple reminder emails to complete the survey. The survey link was embedded in the recruitment email that was emailed to all students in the *College of Health Professions* at the site university. Survey items contained questions regarding intrinsic motivation, extrinsic motivation, prosocial motivation, and intensity of fitness tracker utilization. Recruitment began following university IRB approval of the study (See Appendix A).

Site and Sample

This study was conducted at a large public university in the Midwest of the United States. The total number of students enrolled at the university for 2018 is 20,544. Out of the total enrollment, there are 2,348 students in the *College of Health Professions*.

There are seven different schools within the *College of Health Professions*. These schools include allied health technology, counseling, nursing, nutrition and dietetics, social work, speech language pathology and audiology, and sports science and wellness. This research was conducted on only undergraduate students within these individual schools. Additional inclusion criteria included: 18 years of age or older and either part-time or full-time enrollment status. No students were excluded due to sex, ethnicity, race, or age, as long as they were at least 18 years of age.

Sampling Methods

The study was conducted using a convenience, non-probability sampling method via email. In order to do so, the team's advisor coordinated efforts with a member of the student success. This contact person used student emails to send out three waves of emails, one week apart, which contained the recruitment information (see Appendix A). Waves were used to promote recruitment of a larger sample and to increase the chances of receiving feedback. Students were informed that their participation was voluntary and anonymous and that they would not be compensated for their participation. However, their participation would make this research possible and increase understanding about how to promote physical activity and fitness in young adults. Individual participation was optional: classifying this as convenience sampling. Students interested in participating in the study were asked to click an embedded link in the recruitment email, which included a consent form (see Appendix A) with background information, the purpose of the study, participation procedures, rights of human subjects in

research, and time burden. Students were asked to check a box indicating informed consent, which automatically connected them to the online data collection survey (See Appendix B).

The research team is aware of the limitations in this method of sampling. As stated before, the survey measured motivation and intensity of tracker usage from a convenience sample. Therefore, the results may be skewed since there was the possibility that the participants who took part in the survey would tend to exhibit higher self-efficacy, as they were the ones who found interest in the topic and volunteered their time.

Data Collection

After the research participants gave informed consent (see Appendix A), data collection began. The survey data was collected online from university provided Qualtrics. The recruitment and data collection took around three weeks to complete, and the survey itself took approximately ten minutes to complete. Data was electronically stored in Qualtrics until this study was completed and then was imported into a statistical data analysis software program. Data was stored in password-protected computers and eventually destroyed as required by the university IRB. Only the research team members and project sponsor had access to the data.

Measures

To measure the research variables, a motivational tool was utilized. In addition to a motivational tool, a tracker usage tool was used to measure frequency. Questions about extrinsic, intrinsic, and prosocial motivation were asked in the survey, along with questions regarding fitness tracker usage and activity level.

Motivational Tool

Motivation was measured at the interval level with a 15-item motivation tool developed from Deci and Ryan's (2008) and then modified by Moran, Diefendorff, Kim, and Liu (2012).

Questions measuring extrinsic, intrinsic, and prosocial motivation were asked in the survey. As Deci and Ryan proclaim, motivation falls under three categories. Intrinsic motivation comes from a desire to follow through with a task for self-satisfaction. On the other hand, extrinsic motivation is based on the external rewards one may receive by finishing the task. Prosocial motivation is exhibited by individuals who are driven to help others. Participants were asked to respond on 5-point Likert scales rating to what extent they agreed or disagreed (coded as 1=strongly disagree, 2=somewhat disagree, 3=neither agree nor disagree, 4=somewhat agree, 5=strongly agree) with each of the following questions:

Why are you motivated to work out...

1. Because I would look good. (Intrinsic)
2. Because others would be disappointed if I did not. (Extrinsic)
3. Because I would feel guilty if I did not. (Intrinsic)
4. Because I would feel ashamed if I did not. (Extrinsic)
5. Because I would feel bad about myself if I did not. (Intrinsic)
6. Because I believe exercise is valuable. (Intrinsic)
7. Because physical activity is important. (Intrinsic)
8. Because I value the exercise. (Intrinsic)
9. Because I have access to the recreation center. (Extrinsic)
10. Because I think the exercise is fun. (Intrinsic)
11. Because I think I would find exercise mentally engaging. (Intrinsic)
12. Because I want to motivate others to exercise. (Prosocial)
13. Because I want to inspire others. (Prosocial)

Ratings from items were summed to measure at the interval and continuous level and coded so that higher ratings indicated higher levels of extrinsic, intrinsic, and prosocial motivation. Deci and Ryan are recognized by psychologists worldwide and at institutions such as the Self Determination Institute as being highly credible. Both have written books on the subject and their tool has been widely used due to its high amount of validity and reliability.

Fitness Tracker Usage Tool

Intensity of fitness tracker usage was measured at the summed interval level with a 10-item, researcher constructed measure guided by SCT, tracker apps, and tracker measures. Participants were asked to respond to each question within the survey on a five-point Likert scale. Participants responded to questions by rating to what extent they agreed or disagreed with the statement (coded as 1=never, 2=sometimes, 3=about half the time, 4=most of the time, 5=always). The following items were used to measure intensity of tracker usage:

1. On average, how frequently do you meet your daily activity goals?
2. On average, how frequently do you track your active minutes?
3. On average, how frequently do you track your calories burned?
4. On average, how frequently do the fitness reminders change your activity/behavior?
5. On average, how frequently do you utilize the phone app that logs your information?
6. On average, how frequently do you share your activity with other users or join groups?
7. On average, how frequently do you wear your fitness tracker?
8. On average, how frequently do you use your fitness tracker to monitor sleep?
9. On average, how frequently do you record how many glasses of water you drink in a 24-hour period?
10. On average, how frequently do you use your fitness tracker to track your food intake?

After data collection was completed, the item responses were coded so that higher ratings indicated higher intensity of tracker usage. Additionally, advising faculty and project team consultants established face validity of the measures.

Data Analysis

After the data had been collected, the responses were imported into a statistical data analysis software program, Statistical Package for the Social Sciences (SPSS) 21. Data was managed to identify any missing data and outliers, as well as distribution of data. Level of statistical significance was set at <.05. Descriptive statistics analyzed the data to describe the sample and variables.

Analysis answered the following three research questions:

1. Is there a relationship between intrinsic motivation and the usage of fitness trackers?
2. Is there a relationship between extrinsic motivation and the usage of fitness trackers?
3. Is there a relationship between prosocial motivation and the usage of fitness trackers?

To evaluate intrinsic motivation, questions 1, 5, and 7 from the motivational tool were chosen and used to gauge if the reason behind participant's motivation was because they believe it makes them look good, because they would feel bad if they did not exercise, or because they believe physical activity is important. Questions 2, 4, and 9 from the motivational tool were used to look at extrinsic motivation to see if study participants agreed that they exercised because either they believed others would be disappointed in them, that they would feel ashamed if they did not, or because they had access to the student recreation center. Lastly, to investigate prosocial motivation, questions 12 and 13 from the motivational tool were used and measured whether or not participants were motivated to work out based on their desire to either motivate or inspire others.

All variables were measured at the interval level as continuous and their relationships were examined through inferential statistics. An appropriate statistical test to determine if there is a relationship between motivation and fitness tracker usage is the Pearson coefficient correlation. This test determined the strength and direction of the relationships between variables. Statistical significance was determined by a probability known as the "*p*" value. What this value means is that if the degree of a relationship is <.05, then the results may be statistically significant, or not only due to chance.

Results

Descriptive statistics were used to explore the relationship between fitness tracker usage and motivation. In total, 74 students completed the survey, and all responses that were incomplete were excluded. The data was analyzed by using the Statistical Package for the Social Sciences, or SPSS, through which Pearson correlation tests were run. Independent correlation tests were used to answer the following research questions: 1) Is there a relationship between intrinsic motivation and fitness tracker usage?; 2) Is there a relationship between extrinsic motivation and fitness tracker usage?; and 3) Is there a relationship between prosocial motivation and fitness tracker usage? The value that was utilized in order to measure degree of fitness tracker usage was the statement which asked participants to rate how often they wore their fitness trackers. The average value of how frequently participants stated they wore their fitness trackers was 4.479 out of 5 on a 5-point Likert scale in which a rating of 5 indicates that they always wear it and a rating of 1 indicates never wearing their tracker.

Is there a relationship between intrinsic motivation and fitness tracker usage?

To explore the relationship between fitness tracker usage and intrinsic motivation, responses to the motivational statements regarding the importance of physical activity, looking good, and feeling guilty were used. When comparing the means of the three types of

motivational statements, the intrinsic-based statements were the highest. The statement in which the importance of physical activity was a motivator for working out had a mean response of 4.767 out of 5 on a 5-point Likert scale, with a rating of 5 indicating strong agreement with the statement and a rating of 1 indicating a strong disagreement with the statement. The participants mean response to exercising because it makes them look good, had a mean of 4.164 out of 5. Lastly, the mean response to the statement that the participants exercise because they would feel guilty if they did not, was 3.726 out of 5. In addition to looking at the responses to the three intrinsic motivational statements listed above, the totals of all of the intrinsic questions were added together, and then these scores were averaged among the 74 participants in order to generate a composite score of intrinsic factors. This mean composite score was 8.808 out of a possible total score of 15.

A series of Pearson correlations were calculated to determine if there was a relationship between how frequently participants wear their fitness trackers and participants' ratings of three of the intrinsic motivation statements: 1) Because the physical activity is important, 2) Because I would look good, and 3) Because I would feel guilty. The results showed insignificant and or weak relationships between the variables (See Table 1). Therefore, frequency of fitness tracker usage was unrelated to intrinsic motivational factors. A Pearson correlation was also calculated to determine the relationship between how frequently participants wear their fitness trackers and the composite score for intrinsic motivational factors. The Pearson correlation did not indicate a relationship between those two variables, therefore showing again that frequency of fitness tracker usage was unrelated to the summed intrinsic motivational scores.

Table 1

Frequency using Fitness Tracker and Intrinsic Factors

Intrinsic motivation statement	**Mean**	**Pearson**
Because physical activity is important	4.767	.072
Because I would look good	4.164	.025
Because I would feel guilty	3.726	.058
Composite score for all intrinsic motivational factors	8.808/15	-.005

Is there a relationship between extrinsic motivation and fitness tracker usage?

The relationship between fitness tracker usage and extrinsic motivation was examined using the motivational responses to the motivational statements regarding feeling ashamed if one did not work out, feeling that others would be disappointed in them, and working out because of the accessibility of the student recreations center. Responses to the statement regarding working out in order to avoid feeling ashamed had a mean of 3.315 out of 5. The mean response for the statement that others would be disappointed was 2.136 out of 5. The final statement on the extrinsic motivational factor of having access to the student recreation center had a mean of 2.863 out of 5. Each of these ratings, as with the intrinsic statements, were measured on a 5-point Likert scale, with a rating of 5 indicating strong agreement with the statement. For each participant, the totals of the three extrinsic questions examined were added together, and then these scores were averaged among the 74 participants in order to generate a composite score of extrinsic factors. The average score of all of the extrinsic statements was calculated to be 11.8767 out of 15, which was higher than that of the averaged score of the intrinsic statements and prosocial statements.

A series of Pearson correlations were calculated to determine the relationship between how frequently participants wear their fitness trackers and participants' ratings of three of the extrinsic motivation statements (See Table 2). After the tests were run, the results showed insignificant and weak relationships between the variables. Therefore, frequency of fitness tracker usage was unrelated to extrinsic motivational factors. A Pearson correlation was also calculated to determine the relationship between how frequently participants wear their fitness trackers and the composite score for extrinsic motivational factors. Insignificant results were found, therefore showing again that frequency of fitness tracker usage was unrelated to summed extrinsic motivational scores.

Table 2

Frequency using Fitness Tracker and Extrinsic Factors

Extrinsic motivation statement	**Mean**	**Pearson**
Because I would feel ashamed if I did not	3.315	.000
Because others would be disappointed	2.136	-.053
Because I have access to a student rec center	2.863	.130
Total score for all extrinsic motivational factors	11.8767/15	-.036

Is there a relationship between prosocial motivation and fitness tracker usage?

The means for the prosocial-based motivational statements were slightly lower than the intrinsic motivational statements. The mean response to the statement of working out in order to motivate others was 3.396 out of 5, while the prosocial statement focusing on wanting to inspire

others by working out had a mean response of 3.191 out of 5. As with the composite scores generated for the intrinsic and extrinsic statements, a mean score of prosocial responses was calculated to be a 6.561 out of a total possible score of 10 (See Table 3).

A series of Pearson correlations were calculated to determine the relationship between how frequently participants wear their fitness trackers and participants' ratings of two of the prosocial motivation statements. After the tests were run, the results showed insignificant and weak relationships between the variables. Therefore, frequency of fitness tracker usage was unrelated to prosocial motivational factors (See Table 3).

A Pearson correlation was also calculated to determine the relationship between how frequently participants wear their fitness trackers and prosocial factors as a whole using the prosocial composite score. For each participant, the totals of the two prosocial questions examined were added together, and then these scores were averaged among the 74 participants in order to generate a composite score of prosocial factors. When these scores were correlated, insignificant results were found, therefore showing again that frequency of fitness tracker usage was unrelated to summed prosocial motivational scores.

Table 3

Frequency using Fitness tracker and Prosocial factors

Prosocial motivation statement	**Mean**	**Pearson**
Because I want to motivate others	3.369	-.013
Because I want to inspire others	3.191	-.023
Composite score for all prosocial motivational factors	6.561/10	.0185

When reviewing the prosocial data, another question arose to see if there was a relationship between posting or sharing one's workouts to social media and the two prosocial motivational statements. Thus, another series of Pearson correlation tests were run specifically to examine the relationship between how frequently participants shared their activity with others or participated in groups and participant's ratings of two of the prosocial motivation statements concerning wanting to motivate and wanting to inspire others. The mean score when participants were asked to rate how frequently they shared their activity or joined groups was 1.89 out of a possible score of 5. Although the results comparing participants' motivation to inspire others and their frequency of sharing activity with others/participating in groups were insignificant and showed no relationship, a significant, weak positive correlation was found $r(74)= .27$, $p <0.05$, thus indicating that as prosocial motivational scores factors increased, the frequency of sharing activity with others/participating in groups also increased (See Table 4).

Table 4

Frequency for sharing activity and Prosocial factors

Prosocial motivation statement	**Mean**	**Pearson**
Because I want to motivate others	3.369	.270*
Because I want to inspire others	3.191	.181

*$p <0.5$

Discussion

When taking a close look at the results of the study, it is important to observe the differences among the means. With more specific analysis, it can be concluded that the means for intrinsic motivation were significantly higher than the means for prosocial and extrinsic

motivation. This was an unexpected finding due to the social generation that we live in, as it is easy to assume that the means for prosocial motivation would be higher than that of other types of motivation. However, in this study this was not the case. Prosocial motivation was not found to carry a high correlation with the use of WFTs despite the ever-increasing social connection that users are accustomed to. Additionally, the extrinsic motivation means were also found to be low despite assumptions that individuals are more extrinsically motivated.

As discussed previously, motivation and WFTs are being studied extensively due to the rising popularity of WFT usage in society. Some researchers, such as Maher et al. in 2017, reported that the vast majority of their participants exhibited an increase in motivation and physical activity as they utilized their electronic fitness trackers more frequently (Maher et al., 2017). However, the results of our study did not show significance in the relationship between frequency of fitness tracker usage and intrinsic, extrinsic, or prosocial motivation. This suggests that the usage of fitness trackers may be based less on motivation and potentially more on other factors. One potential explanation for this could be the rise of consumerism nationwide, which would result in more participants having WFTs just to conform with perceived societal norms and not for the purpose of motivation for fitness. Additionally, since WFTs also give individuals the ability to receive their phone notifications on their watches, the driving factor for usage of WFTs could have been based more upon the convenience of not having to carry one's cell phone at all times. Another possible explanation for why the findings of this study differed from those of Maher et al. and others could be that the participants in this study consisted of a homogenous sample of students preparing for a career in healthcare. Other studies examined vastly different groups of individuals, and thus this could explain the difference in the results. Furthermore, the survey questions that were posed may not have adequately represented the research question, and this could be another explanation for the insignificance of the results.

Conclusion

This study provides insight into the recent rise in popularity of WFTs and their motivational value. WFTs are advertised as being an effective tool for individuals to increase their personal health and wellness and to motivate the user to reach their goals as well as including options for the user to post their progress and results on social media platforms. This study was unable to support the hypothesis that intrinsic, extrinsic, and prosocial motivators would correlate with the WFT usage of individuals studying health professions.

The study could be further expanded to evaluate if people with a chronic illness or significant comorbidity, such as obesity, have a higher prevalence of WFT usage compared to users with no significant health history. A question to further study would be if patients with a chronic illness or comorbidity have higher motivation to improve their health outcomes more so than someone without the diagnosis of a chronic illness. Furthermore, the research could be expanded to majors outside of the college of health professions. By doing so, the study could identify if there is a difference in health motivation between college of health professions students and the general college population. For example, health majors have specific education focused on body health maintenance, meaning they may have a better understanding on the importance of taking care of one's self. Unfortunately, this study was limited due to the small number of students that were surveyed (N=74) at one college, and the even smaller demographic that we were aiming to study; only students who utilize wearable fitness trackers.

This study could be implemented in the healthcare setting through nursing practice. Nurses caring for patients at risk for chronic illnesses should understand the motivational factors contributing to lifestyle change. The research on WFTs can be impactful as nurses are developing care plans for their patients and considering different interventions to implement.

Nurses can use the data of motivation and fitness trackers to encourage patients to make healthy lifestyle changes. In conclusion, this study provides additional insight and raises additional questions regarding the relationship between the usage of wearable fitness trackers and personal reports of motivation from users.

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Appendix A

The University of Akron

Institutional Review Board

Title of Study: The Relationship Between Intensity of Fitness Tracker Usage and Motivation

Introduction: This is a research project by Rachel Cannata, Julianne Green, Abigail Daugherty, Pial DasGupta, and Madison DiRocco. You are invited to participate in a research project being conducted by Rachel Cannata, Julianne Green, Abigail Daugherty, Pial DasGupta, and Madison DiRocco, students in the Department of Nursing at The University of Akron.

Purpose: Our purpose is to measure fitness tracker use and the connection to motivation. We expect 100 participants.

Procedures: The participants will be asked to answer a survey of 25 questions on tracker usage and motivation.

There will be no post-study follow up.

You are eligible to participate in the study if you are an undergraduate student in the *College of Health Professions.* Participants can be part-time or full-time students. No persons will be excluded based on gender, ethnicity, race, sexual orientation, marital status, or age as long as they are 18 years of age or older.

Benefits, Risks, and Discomforts: You will receive no direct benefit from your participation in this study, but your participation may help us to better understand the correlation between fitness tracker use and motivation. You will complete this survey at your leisure in a comfortable secure environment of your choice. There are no direct risks to this survey**.**

Right to refuse or withdraw: Participation is voluntary. Refusal to participate or withdrawing from the study at any time will involve no penalty. Failure to participate in no way affects your academic standing.

Anonymous and Confidential Data Collection: *Data collection is anonymous.* No identifying information will be included in the data you provide. Your signed consent form will be kept separate from your data and nobody will be able to link your responses to you.

Confidentiality of records: *This survey is loaded into Qualtrics, an electronic survey software program. You will complete the survey electronically at your own convenience. Electronic survey completion means that data are automatically entered into a data set. Disconnecting participants from their surveys is also related to protection of human participants.*

Who to contact with questions: If you have any questions you may contact researchers Rachel Cannata (rc109@zips.uakron.edu), Madison DiRocco (mod9@zips.uakron.edu), Pial DasGupta (pd50@zips.uakron.edu), Julianne Green (jg164@zips.uakron.edu), Abigail Daugherty (aco15@zips.uakron.edu), or sponsor Dr. Zelko (mzelko@uakron.edu).

This project has been reviewed and approved by The University of Akron Institutional Review Board. If you have any questions about your rights as a research participant, you may call the IRB at (330)-972-7666.

Acceptance & signature: I have read the information and voluntarily agree to participate in this study. My completion and submission of this survey will serve as my consent. I may print a copy of this consent statement for future reference.

Appendix B

Informed Consent and Survey Questions

The Relationship Between Intensity of Fitness Tracker Usage and Motivation

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Start of Block: Default Question Block

INFORMED CONSENT; PLEASE READ IN ORDER TO CONTINUE
You will receive no direct benefit from your participation in this study, but you participation may help us to better understand the correlation between fitness tracker use and motivation. You will complete at your leisure in a comfortable secure environment of your choice. There are no direct risks to this survey.Right to refuse or withdraw: Participation is voluntary. Refusal to participate or withdrawing from the study at any time will involve no penalty. Failure to participate in no way affects your academic standing.Anonymous and Confidential Data Collection: Data collection is anonymous. No identifying information will be included in the data you provide. Your signed consent form will be kept separate from your data, and nobody will be able to link your responses to you. Confidentiality of records: This survey is loaded into Qualtrics, an electronic survey software program. You will complete the survey electronically at your own convenience. Electronic survey completion means that data are automatically entered into a data set. Disconnecting participants from their surveys is also related to protection of human participants.Who to contact with questions: If you have any questions you may contact researchers Rachel Cannata (rc109@zips.uakron.edu), Madison DiRocco (mod9@zips.uakron.edu), Pial DasGupta (pd50@zips.uakron.edu), Julianne Green (jg164@zips.uakron.edu), Abigail Orosz (aco15@zips.uakron.edu), or sponsor Dr. Zelko (mzelko@uakron.edu).This project has been reviewed and approved by The University of Akron Institutional Review Board. If you have any questions about your rights as a research participant, you may call the IRB at (330) 972-7666.

○ I consent and wish to proceed. (1)

Skip To: Q1 If INFORMED CONSENT; PLEASE READ IN ORDER TO CONTINUE You will receive no direct benefit from your part = I consent and wish to proceed.

Q1 Why are you motivated to work out?

	strongly disagree (1)	disagree (2)	neither agree nor diagree (3)	somewhat agree (4)	strongly agree (5)
Because other people in my life expect it. (1)	○	○	○	○	○
Because I would look good. (2)	○	○	○	○	○
Because others would be disappointed if I did not. (3)	○	○	○	○	○
Because I would feel ashamed if I did not. (4)	○	○	○	○	○
Because I would feel bad about myself if I did not. (5)	○	○	○	○	○
Because I would feel guilty if I did not. (6)	○	○	○	○	○
Because I believe exercise is valuable. (7)	○	○	○	○	○
Because the physical activity is important. (8)	○	○	○	○	○
Because I value the exercise. (9)	○	○	○	○	○
Because I have access to the student recreation center. (10)	○	○	○	○	○

Because I think the exercise is fun. (11)	○	○	○	○	○
Because I think I would find exercise mentally engaging. (12)	○	○	○	○	○
Because I care about benefitting myself through my exercise. (13)	○	○	○	○	○
Because I want to motivate others to exercise. (14)	○	○	○	○	○
Because I want to inspire others. (15)	○	○	○	○	○

Q2 The following questions relate to the frequency of fitness tracker usage.

	Always (1)	Most of the time (2)	About half the time (3)	Sometimes (4)	Never (5)
On average, how frequently do you meet your daily activity goals? (1)	○	○	○	○	○
On average, how frequently do you track your active minutes? (2)	○	○	○	○	○
On average, how frequently do you track your calories burned? (3)	○	○	○	○	○
On average, how frequently do the fitness reminders change your activity/behavior? (4)	○	○	○	○	○
On average, how frequently do you utilize the phone application that logs your information? (5)	○	○	○	○	○
On average, how frequently do you share your activity with others or join groups? (6)	○	○	○	○	○
On average, how frequently do you wear your fitness tracker? (7)	○	○	○	○	○
On average, how frequently do you use your fitness tracker to monitor your sleeping pattens? (8)	○	○	○	○	○

On average, how frequently do you record how many glasses of water you drink in a 24 hour period? (9)	○	○	○	○	○
On average, how frequently do you use your fitness tracker to track your food intake? (10)	○	○	○	○	○

Appendix C

Research Table of Evidence

APA formatted reference	Purpose statement. Research Question	Theoretical Framework	Design of study, Site, Sampling Method, Sample Size	Variables and measurement tools	Findings, Conclusion	Limitations of Findings
1 Jackson, D. (2010). How Personal Trainers Can Use Self-Efficacy Theory to Enhance Exercise Behavior in Beginning Exercisers. *Strength and Conditioning Journal*,*32*(3), 67-71. doi:10.1519/ssc.0b013e3181d81c10	Purpose statement: The purpose of this research is to determine the correlation between self-efficacy and exercise behavior. Research question: What is the relationship between self-efficacy and exercise?	The theoretical framework is guided by the idea that self-efficacy is an important factor in determining one's behavior and lifestyle choices.	Design: *Nonexperimental, correlational with cross-sectional data collection with* . survey of 2,053 randomly sampled adults Site: San Diego, California Sampling method: random sampling Sample size: 2,053 adults	Variables: age, gender, amount and exertion of physical activity, level of self-efficacy Measurement tool: self-report on questionnaire	Findings: People with higher self-efficacy have a lower perceived exertion during exercise. Exercise, in return, improves one's self-efficacy. Simply stated, self-efficacy is both a predictor and an outcome of exercise. Conclusion: Increasing an individual's self-efficacy can increase that person's level of physical activity, ultimately impacting their health and wellness.	Limitations: The findings only focused on individuals in San Diego, without considering a potential geographical impact on exercise behaviors. Also, it could not be determined if these adults chosen at random performed the same level of physical activity prior to the study. The study also was biased towards males, evidenced by unequal gender participation.

2. Jakicic, J. M., & Belle, S. H. (2017). Wearable Technology and Long-term Weight Loss—Reply. *Jama*,*317*(3), 319. doi:10.1001/jama.2016.19274	Purpose Statement: The purpose of this study was to see if Fitness Trackers play a key role in weight loss. Research Question: Can fitness trackers help users lose more weight than just using standard	The theoretical framework builds upon behavioral theories and looks at what environmental factors tend to discourage or encourage one's abilities.	Design: *RCT with* two groups were put on a healthy diet and exercise plan. One group used fitness trackers and the other did not. Site: University of Pittsburgh Sampling method: *Convenience with random group assignment* Size: 471 *how many in each group?*adult participants	Independent Variable: those who received standard intervention Variables: those who received enhance weight loss methods Measurement tools: weekly weigh-ins, measurement of oxygen consumption, cardiorespiratory function, and weight loss questionnaire	The study found that as a whole the group with standard interventions lost an average of 8 pounds more than the group with enhanced interventions (trackers). In conclusion, weight loss trackers themselves are the most effective when the user is already dedicated and committed to losing weight.	There was no significant difference between the two groups and there can be many environmental factors outside of fitness trackers that could have affected the results.
3 Maher, C., Ryan, J., Ambrosi, C., & Edeny, S. (2017). Users Experience of Wearable Activity Trackers: A Cross Sectional Study. *BMC Public Health*,*17*. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5688726/.	Purpose Statement: The purpose of this study was to examine weather fitness trackers help users adopt a healthier lifestyle.	The theoretical framework is based on methods of learning. The study took into account how information needs to be presented to an individual	Design: Non-experimental. A survey was distributed to participants of various facebook health and fitness groups. The survey assessed the	Variables: data usage, behavior change, motivation, practical issues Measurement tool: 5 point Likert Scale	Findings: The study received generally favorable views towards fitness devices. Conclusions: Fitness devices can help users commit to adopting a healthy	The study tested people who were part of health and fitness facebook groups. Those in these groups may already be more dedicated to making health a priority so educating them with devices would be easier to do. This study cannot accurately conclude that people who have not been compliant with

	Research Question: Do fitness trackers successfully educate and motivate users to engage in healthier practices?	in order to be educated on a topic. In this case, it was how fitness trackers conveniently organize health information so users can follow along.	users perceptions of usefulness and accuracy of the devices. Site: University of South Australia Human Research Ethics Committee Sampling method: stratified sampling Sample Size: 237		lifestyle by teaching and motivating wearers.	healthy lifestyles before would be greatly affected as well.
4 Kinney, D. D. College students' use and perceptions on wearable fitness trackers and mobile health apps. [S.l.]: ProQuest Information & Learning, 2018. Retrieved from <http://ezproxy.uakron.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2018-21180-036&site=ehost-live>.	Purpose statement: The purpose of this study was to assess college students use and perceptions of wearable fitness trackers (WFT) and the relationship of these factors to health information. Research Question: Do wearable	The theoretical framework that guided this study was Bandura's Social Cognitive Theory, particularly those concerning knowing model behaviors and behavior change. According to the theory, one must be aware of one's own behaviors in	Design: Non-experimental survey, cross-sectional. Site: University of Cincinnati, a large public research university. Sampling method: Convenience sampling. Sample size: 356.	Variables: WFT usage reported by counting the number of items tracked on WFT, self-efficacy and motivation, level of physical activity, Dependent variable: confidence to engage in physical activity, motivation. Dependent variables: number of steps, distance/miles, active minutes, calories burned, number of stairs	Findings: Of the students who did use a WFT, 84% reported that they used their tracker's mobile health app. The use of the mobile health app was the only significant predictor in increasing motivation in students.	Limitations of findings: There were several limitations. The survey did not include how users who "used to" have a WFT used their trackers. Additionally, the sampling only included young adults in college and thus missed part of the young adult population. Finally, self-reporting of fitness is often exaggerated and over-reported, and thus the results may not be accurate.

	fitness trackers impact self efficacy and motivation for physical activity in college students?	order to change their motivation and actions, and the wearable fitness tracker provides this.		climbed, BMI, race, gender.		
5 Bennett, B. L., Goldstein, C. M., Gathright, E. C., Hughes, J. W., & Latner, J. D. (2017). Internal health locus of control predicts willingness to track health behaviors online and with smartphone applications. *Psychology, Health & Medicine*, *22*(10), 1224–1229. https://doi.org/10.1080/13548506.2017.1317354	Purpose statement: To examine the effects of how personal health locus of control can predict willingness to use mobile health apps (mHealth) and wearable fitness trackers (WFT). Research question: Does a stronger health locus of control predict increased usage of mobile health apps and wearable fitness trackers?	Theoretical framework: The researchers in this study used the Multidimensional Health Locus of Control (MHLC) questionnaire. This survey helps distinguish between internal, powerful other, and chance health locus of control. The study also uses the Survey of Health App Usage questionnaire, which scales app tracking of a variety of activities.	Design: Non Experimental cross-sectional study. Survey-based. Site: A large Midwestern public university. Sampling method: Convenience sample via the university. Email sign-up for the survey and then an online survey students filled out. Sample size: 277	Dependent Variables: Online tracker usage (calorie intake, exercise patterns, nutrition, sleep patterns, etc) and health app usage using the SHAU scale. Independent variables: Age, gender, BMI, education, risky behaviors (smoking, drinking, drug use), internal locus of control (via MHLC).	Findings: Individuals with a higher internal and powerful other health locus of control were positively correlated with willingness to use apps, and chance locus of control was not correlated with willingness to use apps and online trackers.	Limitations: There are a few limitations to this study. The sample contained mostly white female participants, and thus was not very diverse. Additionally, self-reporting often leads to skewed results as individuals tend to over report their own usage of fitness apps and trackers. Furthermore, the study assumed that the participants had daily access to technology for the apps, which is not necessarily something that can be assumed.

6 Asimakopoulos, S., Asimakopoulos, G., Spillers, F. (2016) Motivation and User Engagement in Fitness Tracking: Heuristics for Mobile Healthcare Wearables. *Informatics*, 10, 3390.	Purpose statement: The purpose is to examine self-determination to detect motivational criteria in the application of college engagement for fitness tracking and mHealth apps. Research question: What is the impact of health technology and the direct impact on motivation and the design implications used to improve fitness trackers.	The theoretical framework for the study is based on the social cognitive theory and the behavioral theory in relation to mHealth apps.	Design: non-experimental diary study and online survey Site: online recruitment Sampling method: Participants recruited globally with the majority from the U.S were found through Experience Dynamics Inc, participant database, that took 34 active users. Sample size: 34 people	Dependent: attitudes towards health technology Independent: Gender, age, education, computer, and health technology experience.	Findings: The study reported that users also incorporated other personal wellness tools such as food journaling, sleep cycle, and other personal wellness tools.	The limitations of the study include the small sample size and goal setting abilities. The limitation was that the goals were predetermined which created a limitation for participants to add personalized goals.
7 Mercer, K., Li. M., Giangregorio. L., Burns. C., Grinarod. K. (2016) Behavioral Change Techniques Present in Wearable Activity Trackers: A Critical Analysis. *JMIR Mhealth Uhealth*, 4, 40.	Purpose statement: To examine if the design of fitness trackers incorporates behavioral change techniques. Research question: Do behavioral change techniques relate to self	The study uses evidence-base d techniques to identify behavioral change techniques in emerging technology.	Design: calculates interrater reliability using Cohen's Kappa. Site: 40-ite, CALO-RE taxonomy Sampling method: Wear the fitness tracker for one week to code for the	Dependent: the specific behavioral change technique Independent: age, gender, chronic illness, diabetes, heart disease,and physical inactivity	The results showed that a total of nine techniques were present in each tracker. All trackers prompted users to self-monitor and review goals.	The limitations include the severity of chronic illness and the small sample size of seven.

	efficacy while using fitness trackers.		behavioral change techniques. Sample size: 7 older adults in canada with chronic illness			
8 Hermsen, S., Moons, J., Kerkhof, P., Wiekens, C., & Groot, M. D. (2017). Determinants for Sustained Use of an Activity Tracker: Observational Study (Preprint). doi:10.2196/preprints.7311	Purpose Statement: The purpose of this study is to evaluate determinants for sustained use of activity trackers. Research question: What factors determine an individual's adherence to using a fitness tracker?	The theoretical framework for this study is that certain factors may have an influence on whether or not an individual consistently uses fitness trackers.	Design: experimental research study Site: four urban areas of France Sampling Method: participants were given Fitbit tracker to wear; three web-based questionnaires were filled out by participants (at the start, after 98 days, and after 320 days); activity data from each individual's Fitbit was analyzed over the 320 days Sample size: 711 participants	Research Variables: geography (where participants are from), socioeconomic status, age, gender, activity level Measurement tools: questionnaires and logged data within Fitbit	Findings: There was a slow exponential decay in Fitbit use over the 320 day period. On average, participants used Fitbit for 129 days. Conclusion: There are many factors that contribute to sustained fitness tracker use. The decline in consistent tracker usage was slower than expected (when compared to existing literature).	Limitations: Study was conducted in France only. Participants were not randomly selected. Individual participant background was not considered or used when analyzing the results of the study.

9. Aroni, A., Castillo, E., Sousa, C., Machado, A., Filho, E., & Tenenbaum, G. (2018). Smartphone Applications Used for Initiating and Maintaining Physical Activity: An Exploratory Analysis. *Revista de* *Psicología Del Deporte*, *27*, 89–95. Retrieved from http://ezproxy.uakron.edu:2048/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=129283525&site=ehost-live	Purpose Statement: The aim of this study was to explore the degree to which smartphone-based fitness applications help people start and maintain a regular physical activity Research Question: Do applications housed on smartphones motivate people to begin and maintain regular physical activity?	The theoretical framework for this study encompasses the self efficacy influenced by self-tracking of fitness on digital applications.	Site: respondents to a survey in North America, South America, and Europe Sampling Method: A survey composed of demographic questions, closed questions, and scales with Likert-type responses was developed and distributed via social media. Sampling Size: 904 respondents	Variables: Gender, age, whether or not the participant had even downloaded a fitness application onto their smartphone, location, reason for exercising, application used Measurement Tool: Self-report questionnaire, closed and Likert-type questions	Findings revealed that 52.3% of the participants in South America, 72.7% in North America, and 80.1% in Europe had downloaded a physical activity app on their smartphones. Of these participants, 8.1% in South America, 5.9% in North America, and 1.9% in Europe reported that the application helped them very much in beginning an exercise regimen. Similarly, 8.9% from North America, 6.9% from Europe, and 7.1% from South America reported that it helped them very much to maintain their already implemented exercise regimen. The findings revealed that fitness applications for smartphones	Limitations: because the study is a self-report study, there is no guarantee of participant honesty. The authors of the article also did not mention any means of measuring individual self-efficacy, which is a mentality that can vary from person to person. The study was also done on a convenience sample, due to that fact, representation of the entire population can also not be guaranteed.

					have limited effect on exercise engagement; for the majority who download them, the apps remain unused, and at this stage did not become part of their internal state of mind. [Findings from author abstract]	
10. Fotopoulou, A., & O, R. K. (2017). Training to self-care: fitness tracking, biopedagogy and the healthy consumer. *Health Sociology Review*, *26*(1), 54–68. https://doi-org.ezproxy.uakron.edu:2443/10.1080/14461242.2016.1184582	Purpose Statement: Researchers study the potential effect of teaching and fitness tracking in the advancement of self-care. Research Question: Does wearable technology promote teaching and ultimately self-efficacy in it's users?	The theoretical framework in this study is the biopedagogy of wearable technology and the habits that users can develop with long-term usage of the technology.	Site: n/a Researchers combed databases for articles related to biopedagogy of the *FitBit* Sampling Method: keywords, intense database searches, not limited to negative feedback regarding wearable fitness trackers Sampling Size: n/a	Variables: bias by article, age of article, type of article	Data tracking fitness devices can be helpful in promoting health and teaching wearers about health promotion and healthy habits. The detriment to advertising is that the devices can often be not only promoted at fitness trackers but as leisure devices that may not withstand the test of time.	The limitations of this study are extensive. Researchers focused primarily on peer reviewed articles and public articles and reports of the *FitBit.* Because no specific study was conducted it is hard to have solid and justifiable data and a conclusive study. The researchers also focused very closely on the marginal *FitBit*, and filtering any information on other wearable fitness trackers which interferes with the reliability of their conclusion.