

**PHYSICAL ACTIVITY FOR PEOPLE WITH AUTISM SPECTRUM
DISORDER**

An Undergraduate Research Scholars Thesis

by

SARAH A. TINER

Submitted to the Undergraduate Research Scholars program at
Texas A&M University
in partial fulfillment of the requirements for the designation as an

UNDERGRADUATE RESEARCH SCHOLAR

Approved by Research Advisor:

Dr. George B. Cunningham
Dr. Alison Pittman

May 2019

Major: Kinesiology-Motor Behavior

TABLE OF CONTENTS

	Page
ABSTRACT.....	1
Literature Review.....	1
Thesis Statement	2
Theoretical Framework	2
Project Description	2
DEDICATION	3
ACKNOWLEDGMENTS	4
KEY WORDS	5
CHAPTERS	
I. INTRODUCTION	6
II. THEORY	8
Social Ecological Model, Physical Activity, and Disability Status	10
Importance of Healthcare Providers	10
Research Questions	11
III. METHODS	13
Participants.....	13
Measures	13
Procedures.....	14
IV. RESULTS	16
Analysis of Empirical Data.....	16
Themes in Data	17
V. DISCUSSION	20
Implications.....	20
CONCLUSION.....	23

REFERENCES 24

APPENDIX..... 28

ABSTRACT

Physical Activity For People With Autism Spectrum Disorder

Sarah A. Tiner
Department of Health & Kinesiology
Texas A&M University

Research Advisor: Dr. George B. Cunningham
Department of Sports Management
Texas A&M University

Secondary Research Advisor: Dr. Alison Pittman
College of Nursing
Texas A&M University

Literature Review

People with disabilities are significantly less physically active than are people without disabilities (CDC, 2017). There is significant research on the benefits of physical exercise for people with a disability (Darcy, Lock, & Taylor, 2017), but little is focused on specific disabilities, such as Autism Spectrum Disorder (ASD). The purpose of this study is to look specifically at how physical activity (PA) affects those with ASD. Most sport participation research focuses on the constraints of participation in persons with disability in general (Darcy et al., 2017). Each disability has specific needs and constraints that need to be considered. When researchers focus on people with ASD, they typically examine how physical activity affects ASD physically (Bhat, 2014; Menear, 2014) or at the relationship between physical activity and behaviors, like screen time (Bandini, Must, Phillips, Curtin, 2015). In my project, I analyze factors that influence whether healthcare providers, as influential people in the lives of people with ASD, recommend physical activity.

Thesis Statement

My thesis for this study is that physical activity will have many benefits for persons living with ASD, and that these benefits will influence health care providers' recommendations for physical activity for persons with ASD.

Theoretical Framework

In this study, I use the social ecological model in order to examine the multilevel barriers associated with physical activity and ASD. These barriers are then used in order to analyze healthcare providers' positions on whether or not they recommend PA for persons with ASD. The theoretical framework of this study stems from the fact that people with disabilities are significantly less physically active than are people without disabilities. The purpose of this study is to look specifically at how physical activity (PA) affects those with ASD, and why healthcare providers should recommend it to patients.

Project Description

In this study, I focus on the benefits and detriments of being physically active for people with ASD in order to create more physical activity (PA) opportunities for persons with ASD. Through use of the social ecological model to survey nurses on how likely they are to recommend PA for people with ASD, the importance of including it in the lifestyles and community of ASD can be seen. Specifically, I survey nurses and examine their impressions of the societal, community, relationship, and individual factors that affect PA opportunities, then the nurses' likelihood of recommending PA. I examine the associations among these variables to understand which factors are most likely affect recommending PA. By looking at the benefits/detriments of PA, existing and future community programs can be improved for those with ASD.

DEDICATION

I would like to dedicate my work to the families and supporters of individuals with Autism Spectrum Disorder.

“To help children with autism, we don’t need to change them or fix them. We need to work to understand them, and then change what we do.” –Barry M. Prizant

ACKNOWLEDGEMENTS

I wish to present my special thanks to Dr. George Cunningham in the Department of Sports Management at Texas A&M University and the Laboratory for Diversity in Sport for supporting this study. I would also like to thank Dr. Alison Pittman in the Texas A&M College of Nursing.

KEY WORDS

PA Physical activity

ASD Autism Spectrum Disorder

CHAPTER I

INTRODUCTION

Physical activity is beneficial for those who incorporate it into their lives (CDC, 2018). Despite the many benefits of PA, Americans largely are not active at recommended levels (Office of Disease Prevention and Health Promotion, 2008). The Centers for Disease Control and Prevention (CDC) recommends adults should exercise moderately for 150 minutes a week and children should participate in 60 minutes or more of physical activity every day (CDC, 2018). However, according to the same agency about 21 percent of adults meet the physical activity standards, and less than 30 percent of high school students get at least an hour of activity per day in the United States (CDC, 2018).

There are many restraints to getting people active. Much research has gone into studying the restraints of participation in physical activity in order to increase participation (Crawford & Godbey, 1987). This includes research on racial barriers to physical activity (Sawrikar & Muir, 2010) in which the barriers experienced by different racial minorities are examined. Also barriers to physical activity and gender, often women, have been previously researched (Hanlon, Morris, & Nabbs, 2014). Another barrier to PA often examined is poverty (Vandermeerschen & Scheerder, 2017). Poverty can often be a community barrier that affects physical opportunities in different countries. Despite the barriers to participation in PA, it is still beneficial for those who include it into their daily lives.

If physical activity patterns are low nationwide, the figures are even worse for people with disabilities. Having a disability can add on other barriers to participation in physical activity, that people without disabilities may not experience (Darcy et al., 2017). The type and

complexity of barrier depends on the type of disability and the restraints involved in that disability. There can be both physical and social barriers experienced (Darcy et al., 2017). There is significant research focused on the barriers to physical activity experienced by persons with disability (Darcy et al., 2017). How can these barriers be generalized for the wide spectrum of disability restraints effectively? Researchers have shown that the most constructive way to determine constraints for disabilities is through focusing on level of support needs rather than diagnosis of disability type (US Census Bureau Public Information Office, 2016).

The link between physical inactivity and disability status is particularly troublesome given that 19 percent of the US population has a disability (US Census Bureau Public Information Office, 2016). Thus, the purpose of this study was to examine barriers to participation and ways to improve participation in PA. Specifically, I examine the barriers to physical activity for those with Autism Spectrum Disorder (ASD) through use of the social ecological model in surveying healthcare providers. Through examining the likelihood of healthcare providers to recommend PA for ASD, a gap between PA benefits and recommendation for patients can be seen. Through focusing on ASD specifically, future and existing physical activity opportunities for persons with ASD can be improved. Using level of support needs and examining specific disabilities is the best way to examine the restraints on physical activity for specific disabilities.

CHAPTER II

THEORY

In using the social ecological model (McLeory, Bibeau, Steckler, & Glanz, 1988) in this study, I examine the multilevel factors that are associated with physical activity and ASD and the barriers associated with them. The social ecological model is a framework that is used in to better understand the dynamic interrelations of personal and environmental factors associated with behaviors (CDC, 2018). The social ecological model has also been used in order to examine constraints to sport participation in populations like people with disabilities (Darcy et al., 2017), youth and children (Crane, & Temple, 2015), adolescent girls (Eime, Casey, Harvey, Sawyer, Symons, & Payne, 2015), and many others. Looking at the constraints to specific populations helps programs better aim towards including these populations into their programs.

There are five levels of the model: individual, interpersonal, community, organizational, and policy. In this study, I focus on the individual/family, social (group), and community factors that are associated with physical activity and persons with ASD. These factors are the basis for the research questions used to collect data of healthcare providers' perspectives.

The individual or family factors in the social ecological model are the biological and personal factors of the individual or their family that influences behavior. Examples of these individual factors in this study are poor motor skills, behavioral problems, gastrointestinal issues, and over-stimulation that affect the individual with ASD wanting to participate in PA. Researchers found that individual factors like behavioral problems and poor motor skills can be barriers to physical activity and that these barriers are also linked to an increased screen time in children with ASD (Must, Phillips, Curtin, & Bandini, 2015).

Examples of family factors in this study include monetary constraints, transportation constraints, and relationship issues within the family. Previous researchers examining barriers to family leisure activities use the model in order to look at the intrapersonal, interpersonal, and structural barriers that affect preferences and participation in leisure activities (Crawford, & Godbey, 1987). Family leisure in physical activity can be both a conflict and cohesion, and by better understanding the barriers to this leisure, a better environment for family activities can be made.

Community factors are those that have to do with settings, such as schools, neighborhoods, or workplaces (CDC, 2018). Examples of these factors from this study are PA opportunities in the community are limited, too costly, transportation is unavailable, and the neighborhoods are unsafe. Some community factors identified by previous researchers for the ASD population is factors like access to facilities and programs and funding for these programs (Must et al., 2015). Lack of access and funding for physical activity programs makes it difficult for individuals with ASD to participate in PA.

Social factors are the different social relationship barriers that effect behavior. Some examples of these factors in this study are lack of social skills, few friends, not feeling welcome, lack of coaching skills to include people with ASD, and exclusion by typically developing peers. Some previous researchers have not examined social factors that contribute to participation in PA and rather examine child-level factors, peer and family level factors, community factors, and societal factors (Must et al., 2015). Social issues are a symptom of ASD, which is why in this study it is a main focus for participation in PA.

Social Ecological Model, Physical Activity, and Disability Status

The disability population and ASD specifically have previously been examined with the social ecological model. When examining sport participation with disabilities, Darcy, et al (2017) found that level of support needs is the main factor that determines the barriers to participation rather than type of disability. This is important in examining barriers to participation for ASD because the disorder is a spectrum of different levels of functioning and therefore support needs. Physical activity and ASD specifically have not been previously researched heavily. However, the social ecological model has been used to examine screen time as a barrier to PA. The individual, social, and community barriers that are seen in children with ASD make physical activity difficult and less fun for them. This in turn contributes to increased screen time seen among children with ASD (Must et al., 2015).

I use the social ecological model in this study to create our research questions focusing on the healthcare providers' perspectives on the individual, group, and community factors that are associated with physical activity for persons with ASD. This model is important in this study in order to explore the degree to which these multilevel factors and associated benefits are associated with recommendations of physical activity for persons with ASD. This theoretical framework is the best suited for this study because there are many multilevel barriers to physical activity for persons with ASD.

Importance of Healthcare Providers

In this study, I use healthcare providers, specifically nurses in the US, because they are a population that can promote an active lifestyle to their patients. Through healthcare providers recommendations, PA can be included into the lifestyles of individuals with ASD. Researchers found that healthcare providers promote physical activity significantly more than nutrition,

psychological support, medical support, and naturopathy (Ungar et al., 2018). Previous studies have also used healthcare providers in order to examine the barriers to PA experienced by cancer patients in order to better promote PA to this population (Hausmann et al., 2018). These studies show the importance of healthcare professionals in recommending PA to their patients. When a healthcare professional is telling their patient that they need to include PA into their lifestyle because it is beneficial, the patient is much more likely to listen and apply what they are saying than from someone else.

Research Questions

The research questions of this study stem from the social ecological model. The first three research questions examine perspectives of healthcare providers on the individual (RQ1), group (RQ2), and community (RQ3) barriers that are associated with PA among persons with ASD. These barriers can be seen by the previous experience and interaction healthcare providers have with their patients with ASD. Through examining the barriers associated with PA for people with ASD, more opportunities can be seen and improved for persons with ASD to be physically active.

The fourth and fifth research questions of this study examine the extent to which the healthcare providers surveyed perceive benefits of (RQ4) and recommend (RQ5) PA to their patients with ASD. Healthcare providers regularly interact with persons with ASD. This is why it is important to understand whether or not they see potential benefits for PA among people with ASD, and if it is something they regularly recommend. Through seeing the benefits of PA among ASD, more future healthcare providers are likely to recommend PA for their patients.

The last research question uses the data collected to examine the extent to which barriers and potential benefits are associated with recommendations of healthcare providers (RQ6). When

a healthcare provider is trying to decide whether or not they recommend PA for people with ASD, they must consider the potential benefits and barriers associated with it. Do the benefits outweigh the barriers that may stand between people with ASD being physically active? The opinion of healthcare providers on whether or not PA is beneficial for persons with ASD is significant because of their regular interaction with ASD.

CHAPTER III

METHODS

Participants

Surveys were distributed to 173 nurses living in the United States. The sample included 161 (93.06%) women and 12 (6.94%) men, as seen in Table 1. Regarding the racial composition of our sample, there were 19 (10.6%) African Americans, 7 (3.9%) Asian Americans, 5 (2.8%) Hispanics, 1 (0.6%) Native Americans, and 145 (80.6%) Whites, as seen in Table 2. The different types of nurses in this sample consisted of 123 (68.3%) Registered Nurses, 44 (24.4%) Licensed Practical Nurses, 7 (3.9%) Nursing Assistants, and 6 (3.3%) Advanced Practice Nurses, as seen in Table 3. These data is consistent with national demographics of nurses in the US with 2,824,641 RNs and 690,038 LPNs working in the US (Minority Nurse, 2019). The mean age was 46.36 years ($SD = 14.769$, range: 20 to 86 years). The average experience as a nurse was 18.58 years ($SD = 14.308$, range: 1 to 64 years). An important statistic from our sample was how often (1 = not often, 7 = very often) the participants interacted or cared for patients/clients with ASD. The mean interaction level was 2.53 ($SD = .924$). These descriptive statistics can be seen in Table 4.

Measures

Data were collected in 2018 using Qualtrics in order survey nurses on their demographic information, interaction with ASD, and individual, social, and community factors associated with physical activity and ASD. The survey was adapted from previous research to examine these factors (Lang, Kern, Ashbaugh, Regester, Ence, & Smith, 2010). The survey also included the perceived benefits of PA and the extent to which the nurses recommend PA, and participants

made responses on a 7-point scale from 1 (*strongly disagree*) to 7 (*strongly agree*). The mean, range, and standard deviation were calculated for each variable. High mean scores indicate a higher agreement with the statements provided in the survey for each barrier associated with PA. A reliability coefficient (α) was recorded with each variable.

Sample items of the individual and family factors associated with PA and ASD in the survey were statements including “People with ASD miss activities due to gastrointestinal problems” and “Sport and physical activity are over-stimulating.” The reliability for individual barriers was acceptable ($\alpha = .77$). Social barriers statements were those that included “People with ASD have difficult social skills” and “Other sport participants exclude people with ASD.” The reliability for social barriers was acceptable ($\alpha = .76$). Statements in the survey for community barriers included “Physical activity opportunities in the community are limited” and “Physical activity opportunities in the community are too costly”. The reliability for community barriers was acceptable ($\alpha = .66$). We assessed the benefits of PA for people with ASD by stating “People with ASD who participate in regular PA are likely to have,” and sample items included “decreased body fat,” “better behavioral outcomes,” and “more friends”. The reliability for benefits of PA was acceptable ($\alpha = .93$). Whether the nurses recommend PA for people with ASD was measured by asking statements regarding the past three months of “how frequently have you?”. Sample items include “suggested they engage in more PA” and “talked to them about PA?” The reliability for recommendation of PA was very good ($\alpha=.93$).

Procedures

First, we obtained Institutional Review Board approval for this study through Texas A&M University. A survey was created using the Social Ecological Model to examine the individual, social, and community barriers associated with PA and ASD. We contracted with

Qualtrics to obtain a panel data of nurses in the United States to distribute the survey to.

Participation was voluntary, and all responses of the participants were anonymous.

CHAPTER IV

RESULTS

Analysis of Empirical Data

The purpose of this study was to examine the barriers to physical activity for people with ASD on the individual, social, and community level. The means, standard deviations, bivariate correlations, and reliability estimates were calculated for the sample as seen in Table 5. The barriers and whether or not nurses recommend PA were assessed on a 7-point Likert scale. One-sample *t*-tests were used to examine barriers to PA for ASD (RQ 1-3) and the perceived benefits (RQ 4) and recommendations of PA for clients with ASD (RQ5).

The mean and standard deviations of barriers to PA and benefits of PA for people with ASD are seen in Table 5. One-sample *t*-tests to compare the mean scores for each variable against the mid-point of scale. For Research Question 1, individual barriers ($M = 3.937$, $SD = .931$) were moderate in strength and did not vary from the midpoint of the scale (4), $t(179) = -.908$, $p = .365$. With respect to Research Question 2, social barriers ($M = 4.619$, $SD = .960$) were high and significantly higher than the midpoint of the scale (4), $t(179) = 8.652$, $p < .001$. For Research Question 3, community barriers were moderate ($M = 4.047$, $SD = .981$) and did not vary from the midpoint of the scale (4), $t(179) = .645$, $p = .519$. For Research Question 4, the nurses in the sample perceived many benefits with physical activity for people with ASD ($M = 5.455$, $SD = .954$) and were significantly higher than the midpoint of the scale (4), $t(179) = 20.471$, $p < .001$. Finally, for Research Question 5, we compared the mean score for Recommending PA ($M = 2.844$, $SD = 1.184$) to the midpoint of the scale (3), and the differences were not statistically significant, $t(179) = -1.763$, $p = .080$.

Paired-sample *t*-tests were also used to analyze mean differences in the barriers and benefits (see Table 5 for mean scores). The mean score for Individual Barriers was significantly less than the mean score for Social Barriers, $t(179) = -10.916, p < .001$, and the mean score for Benefits, $t(179) = -15.246, p < .001$. The mean scores for Individual Barriers and Community Barriers were not significantly different from one another, $t(179) = -1.423, p = .156$. The mean scores for Social Barriers were significantly higher than those for Community Barriers, $t(179) = 8.352, p < .001$, but significantly lower than the Benefits ratings, $t(179) = -8.868, p < .001$. Finally, the mean scores for Community Barriers were significantly lower than those for Benefits, $t(179) = -15.225, p < .001$.

We analyzed Research Question 6 using Ordinary Least Squares regression (OLS), controlling for the nurse's race and the previous experience with people with ASD—both of which held significant bivariate correlations with Recommendations (see Table 6). The controls accounted for 14.7 percent of the variance in Recommendations ($R^2 = .147, p < .001$; see Table 6). Experience with people with ASD was positively and significantly associated with Recommendations. After accounting for these effects, the barriers and benefits variables accounted for 5.5 percent unique variance ($R^2 = .055, p = .021$). The more nurses held the belief that PA is beneficial for people with ASD, the more likely there are to recommend PA to people with ASD ($B = .26, SE = .09, p = .003$). The barriers variables were not significant.

Themes in Data

The participants had the voluntary option of providing any additional comments on physical activity and sport for people with ASD in a free response section at the end of the survey. There were 55.6% of the participants that chose not to provide any additional comments (100 of $N = 180$). Common themes seen in the free response section were general support for PA

and ASD, other specific benefits and barriers, a need for PA with ASD, support of PA in general, advice, prior experience with this topic, and awareness/education. All participants generally had positive and constructive things to say in their responses.

There were mental, physical, and social benefits seen in the free response section. Some mental benefits of PA were mood, focus, behavior, and self-esteem for individuals with ASD as seen in comments from the sample “It benefits their mood, it helps change their focus” and “It would improve personal gratification if they began to participate in physical activity”. Motor skills and overall physical fitness were suggested and previously seen physical benefits. Socially, people with ASD can benefit from PA by making new friends, increasing social skills, feeling more accepted, providing structure, and learning teamwork. “When they are in sports they have better social skills and feel they are making friends” was one example of this.

Participants offered advice for the community and coaches when incorporating PA into the lives of those with ASD. Integrating typically developing children and children with ASD in sports was something that the nurses suggested. Also, training coaches/facilitators on safety and inclusion for the ASD population through encouragement and patience would be beneficial. Some participants also thought that inclusion in sports for people with ASD is best done through individualizing programs to specific needs. One way of doing this is by “finding something that interests them – a specific sport or activity”.

While there was general support for PA for persons with ASD, barriers to PA were also noted in the free response section. These included over stimulation, lack of opportunities in the community, lack of properly trained coaches, and a lack of resources for PA for people with ASD. These barriers were seen in comments like “They need people who are trained to supervise these activities” and “I believe the main barrier to overcome is over stimulating the individual

and knowing when to stop. Also need to take into consideration the individuals routines and their reactions to change”. These barriers are important to keep in mind when integrating people with ASD into sport opportunities.

A majority of the participants had previous experience with ASD. However, there were also participants that rarely interact with persons with ASD. There were also participants that wanted more information on how they can incorporate PA into the lives of their patients with ASD, because they think it is something that would be beneficial for them. “I would love to be given suggestions for how to make sports more inclusive for those with ASD” was just one response that shows education about ASD and PA in healthcare is important. Many participants also believe that physical activity is not encouraged enough for this population. Some participants also felt that awareness of this topic is important.

CHAPTER V

DISCUSSION

The purpose of this study was to examine the barriers to PA, perceived benefits, and recommendation of PA for individuals with ASD through the perspectives of healthcare providers. Healthcare provider's perspectives are important because they are among the best population to potentially recommend PA for individuals with ASD. The data show that nurses regularly interact with people with ASD, but they only moderately recommend PA for this population. The nurses identified individual, social, and community barriers to PA for people with ASD. However, the data show that these barriers did not impact the healthcare providers' recommendations of PA. While barriers were seen, benefits of PA for people with ASD were seen in the data from the nurses' perspectives, and they were the best predictor of subsequent recommendations. The positive association between benefits and recommendation of PA shows that the more the nurses believed PA to benefit people with ASD, the more likely they were to recommend PA for this population.

Implications

These findings have implications in the medical field, education, and for sport management. Healthcare providers play an important role in promotion of physical activity for people with ASD (Ungar et al., 2018). The current study shows the importance of PA for people with ASD from the perspectives of nurses. Because of this, healthcare providers can recommend PA confidently to their patients with ASD and help implement PA into their lifestyles. Raising awareness of the importance of recommending PA to patients with ASD is important. To do this,

healthcare students could learn about this topic in their classes or trainings so that they can better recommend PA to their patients with ASD.

These results also show that PA is an important subject to include in school programs for people with ASD. Previous researchers found that children with ASD are less active than their typically developing peers during PE, recess, and lunchtime (Pan et al., 2015). This shows the importance of specializing and creating physical activity sport programs/activities for children with ASD. Researchers also found that adults with ASD have a hard time including PA into their lifestyles (Savage, Taber-Doughty, Brodhead, & Bouck, 2018). Instilling good habits of physical activity in children is good for including PA into their lifestyles in the future. One major symptom of ASD that school physical activity programs need to consider when including children with ASD is anxiety. One study found that physical activity can help reduce anxiety in adolescents with ASD and examined ways to limit anxiety in a physical activity setting (Lopata, Donnelly, & Thomeer, 2017). One successful program combines relationship building with physical conditioning in order to better eliminate social isolation and weight gain due to psychotropic medications in children with ASD (Marggraff & Constantino, 2018). Through relationship building, sport organizations and coaches can better individualize sport programs to gain the interest of children with ASD to increase participation. One potential way to help get children with ASD active in school could be by incorporating screen time into PA. A study found that children with ASD have increased screen time (Must et al., 2015) so using screens (video games etc.) could help interest children with ASD and increase participation.

Sport organizations and sport management are very important in providing PA for people with ASD. Through working with healthcare providers, sport organizations can better adapt programs to minimize the barriers to PA seen for individuals with ASD. As seen in the free

response answers in the data, sport organizations can improve their facilities and programs to better include people with ASD through properly training their coaches. Previous research has found that many clubs/sport organizations that provide sport for people with disabilities are not specific disability clubs (Wicker & Breuer, 2014). Through providing specific organizations for individuals with disabilities, and training coaches to be able to include individuals with ASD, sport organizations can better include people with ASD.

This study shows the importance of PA for people with ASD through the perceived benefits from the perspectives of healthcare providers. Future research can find ways to overcome specific barriers to PA for people with ASD. This can help make existing sport organizations more inclusive for the ASD population. Also, because this study shows that PA is important for people with ASD, providers and sports organizations can increase awareness of the need to include PA into daily life.

CONCLUSION

In conclusion, the primary aim of this study was to show the importance of physical activity for persons with ASD through the perspective of healthcare providers. Most previous research focuses on barriers to PA for disabilities in general, whereas this study focuses on ASD specifically. Through use of the social ecological model, barriers to PA for ASD specifically can be seen. Also, a number of cognitive, physical, social, and emotional benefits of PA are seen so that healthcare providers can recommend regular physical activity to this population. This research is important because of the increasing prevalence of Autism Spectrum Disorder in society (US Census Bureau Public Information Office, 2016). This study found a lack of recommendation for PA for people with ASD among nurses that regularly interact with ASD. While barriers to PA were seen, nurses still identified benefits of PA for people with ASD. The more nurses believed PA to benefit people with ASD, the more likely they were to recommend PA for their clients. This shows nurses can impact promoting a healthy and active lifestyle for people with ASD, and highlights the importance of recommending PA for this population among healthcare providers.

REFERENCES

- Centers for Disease Control and Prevention. Physical Activity. (2018, September 12). Retrieved from <https://www.cdc.gov/physicalactivity/data/facts.htm>
- Darcy, S., Lock, D., & Taylor, T. (2017). Enabling inclusive sport participation: Effects of disability and support needs on constraints to sport participation. *Leisure Sciences*, 39(1), 20-41.
- US Census Bureau Public Information Office. (2016, May 19). Newsroom Archive. Retrieved from <https://www.census.gov/newsroom/releases/archives/miscellaneous/cb12-134.html>
- Centers for Disease Control and Prevention (CDC), The Social Ecological Model: A Framework for Prevention (2018). Retrieved from <http://www.cdc.gov/violenceprevention/overview/social-ecologicalmodel.html>
- Crawford, D. W., & Godbey, G. (1987). Reconceptualizing barriers to family leisure. *Leisure Sciences*, 9(2), 119-127. Retrieved from <https://www.tandfonline.com/doi/pdf/10.1080/01490408709512151>
- Darcy, S., Lock, D., & Taylor, T. (2017). Enabling inclusive sport participation: Effects of disability and support needs on constraints to sport participation. *Leisure Sciences*, 39(1), 20-41. Retrieved from <https://www.tandfonline.com/doi/abs/10.1080/01490400.2016.1151842>
- Crane, J., & Temple, V. (2015). A systematic review of dropout from organized sport among children and youth. *European Physical Education Review*, 21(1), 114-131. Retrieved from <http://journals.sagepub.com/doi/abs/10.1177/1356336x14555294>
- Eime, R. M., Casey, M. M., Harvey, J. T., Sawyer, N. A., Symons, C. M., & Payne, W. R. (2015). Socioecological factors potentially associated with participation in physical activity and sport: A longitudinal study of adolescent girls. *Journal of Science and Medicine in Sport*, 18(6), 684-690. <https://www.sciencedirect.com/science/article/pii/S1440244014001972>

- McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education Quarterly*, 15(4), 351-377. Retrieved from <http://journals.sagepub.com/doi/pdf/10.1177/109019818801500401>
- Must, A., Phillips, S., Curtin, C., & Bandini, L. G. (2015). Barriers to physical activity in children with autism spectrum disorders: relationship to physical activity and screen time. *Journal of Physical Activity and Health*, 12(4), 529-534. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4490003/>
- Centers for Disease Control. CDC Features. (2017, October 18). Retrieved from <https://www.cdc.gov/features/physical-activity-disabilities/index.html>
- Office of Disease Prevention and Health Promotion. (2008). 2008 Physical Activity Guidelines for Americans. Retrieved from <https://health.gov/paguidelines/2008/>
- Lang, R. Kern, L., Ashbaugh, K., Regester, A., Ence, W., & Smith, W. (2010). Physical exercise and individuals with autism spectrum disorders: A systematic review. *Research in Autism Spectrum Disorders*, 4, 565-576.
- Sawrikar, P., & Muir, K. (2010). The myth of a 'fair go': Barriers to sport and recreational participation among Indian and other ethnic minority women in Australia. *Sport Management Review* 13(4), 355-367. Doi://doi.org/10.1016/j.smr.2010.01.005
- Hanlon, C., Morris, T., & Nabbs, S. (2014). Program providers' perspective: Recruitment and retention strategies for women in physical activity programs. *Sport Management Review* 17(2), 133-144. Doi: //doi.org/10.1016/j.smr.2013.04.001
- Vandermeerschen, H., & Scheerder, J. (2017). Sport managers' perspectives on poverty and sport: The role of local sport authorities Doi://doi.org/10.1016/j.smr.2017.02.002
- Ungar, N., Schmidt, L., Gabrian, M., Haussmann, A., Tsiouris, A., Sieverding, M., . . . Wiskemann, J. (2018). Which self-management strategies do health care professionals recommend to their cancer patients? An experimental investigation of patient age and treatment phase. *Journal of Behavioral Medicine*, doi:10.1007/s10865-018-9980-1 [doi]
- Haussmann, A., Ungar, N., Gabrian, M., Tsiouris, A., Sieverding, M., Wiskemann, J., & Steindorf, K. (2018). Are healthcare professionals being left in the lurch? The role of

structural barriers and information resources to promote physical activity to cancer patients. *Supportive Care in Cancer : Official Journal of the Multinational Association of Supportive Care in Cancer*, doi:10.1007/s00520-018-4279-x [doi]

Nursing Statistics in the US. (2019). Retrieved from <https://minoritynurse.com/nursing-statistics/>

Pan, C., Hsu, P., Chung, I., Hung, C., Liu, Y., & Lo, S. (2015). *Physical activity during the segmented school day in adolescents with and without autism spectrum disorders* doi://doi.org/10.1016/j.rasd.2015.04.003

Wicker, P., & Breuer, C. (2014). *Exploring the organizational capacity and organizational problems of disability sport clubs in germany using matched pairs analysis* doi://doi.org/10.1016/j.smr.2013.03.005

Lopata, C., Donnelly, J. P., & Thomeer, M. L. (2017). In Kerns C. M., Renno P., Storch E. A., Kendall P. C. and Wood J. J.(Eds.), *Chapter 11 - anxiety and ASD in schools: School-related issues and individualized education programs* Academic Press. doi://doi.org/10.1016/B978-0-12-805122-1.00011-9

Marggraff, A., & Constantino, J. N. (2018). *Physical and psychosocial impact of a university-based, volunteer student-led running program for children with autism spectrum disorder* Doi://doi-org.ezproxy.library.tamu.edu/10.1016/j.jaac.2018.06.02

Tyler, K., MacDonald, M., & Menear, K. (2014). Physical Activity and Physical Fitness of School-Aged Children and Youth with Autism Spectrum Disorders. *Autism Research & Treatment*, 1–6. <https://doi-org.srv-proxy2.library.tamu.edu/10.1155/2014/312163>

Srinivasan, S. M., Pescatello, L. S., & Bhat, A. N. (2014). Current Perspectives on Physical Activity and Exercise Recommendations for Children and Adolescents With Autism Spectrum Disorders. *Physical Therapy*, 94(6), 875–889. Retrieved from <http://proxy.library.tamu.edu.srv-proxy2.library.tamu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=96342818&site=eds-live>

Prizant, B. M., & Fields-Meyer, T. (2016). *Uniquely human: A different way of seeing autism*. New York: Simon & Schuster Paperbacks.

Savage, M. N., Taber-Doughty, T., Brodhead, M. T., & Bouck, E. C. (2018). *Increasing physical activity for adults with autism spectrum disorder: Comparing in-person and technology delivered praised*[doi://doi.org/10.1016/j.ridd.2017.12.019](https://doi.org/10.1016/j.ridd.2017.12.019)

APPENDIX

Table 1. Gender Demographics

	Frequency	Percent
Female	168	93.3
Male	12	6.7
Total	180	100.0

Table 2. Racial Demographics

	Frequency	Percent	Cumulative Percent
African American	19	10.6	10.6
Asian American	7	3.9	14.4
Hispanic or Latino	5	2.8	17.2
Native American	1	0.6	17.8
White	145	80.6	98.3
Other	3	1.7	100.0
Total	180	100.0	100.0

Table 3. Type of Nurse Demographics

	Frequency	Percent	Cumulative Percent
Nursing Assistant	7	3.9	3.9
Licensed Practical Nurse	44	24.4	28.3
Registered Nurse	123	68.3	96.7
Advanced Practice Nurse	6	3.3	100.0
Total	180	100.0	100.0

Table 4. Descriptive Statistics

	N	Minimum	Maximum	<i>Mean</i>	<i>SD</i>
Age (years)	180	20	86	46.36	14.769
Years as a nurse	178	1	64	18.58	14.308
Interaction with patients/clients with ASD	180	2	5	2.53	.924

Table 5. Means, Std. deviations, and Correlations (N = 180)

Variable	1	2	3	4	5	6	7	8	9	10	11
1 Age	---										
2 Gender	-.07	---									
3 Race	-.28	-.02	---								
4 Tenure	.86	-.14	-.31	---							
5 Registered	.10	-.01	-.12	.14	---						
6 Interaction	-.14	.06	.17	-.10	-.05	---					
7 Ind Barriers	-.10	.29	.07	-.10	-.02	.17	---				
8 Social Barriers	.05	.20	-.13	.07	.03	.16	.61	---			
9 Com Barriers	-.09	.18	-.02	-.13	.03	.08	.41	.55	---		
10 Benefits	.09	.04	-.10	.11	.20	.07	-.01	.13	.18	---	
11 Recommend	-.08	.10	.18	-.11	-.02	.37	.06	.02	.10	.23	---

Notes. $|r| \leq .16, p < .05$.

Table 6. Regression Analyses Predicting Recommending PA to People with ASD

Variable	Model 1		Model 2	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Race	.346	.210	.374	.213
Interaction	.443***	.090	.430***	.090
Individual Barriers			.024	.112
Social Barriers			-.133	.120
Community Barriers			.111	.100
Benefits			.264**	.087
R^2	.147		.201	
ΔR^2	.147***		.055*	

Notes. * $p < .05$. ** $p < .01$. *** $p < .001$.