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ORIGINAL RESEARCH ARTICLE
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Physical activity measurement through accelerometry during group tele-exercise in individuals with spinal cord injury: A case series

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Nearly 50% of individuals with spinal cord injury (SCI) are inactive which increases risk for chronic disease and early mortality. Our team previously developed an online group exercise program that is safe, feasible, based on SCI exercise guidelines, and directly responsive to needs and requests of individuals with SCI. The goal of this study was to evaluate the feasibility of measuring physical activity exertion through a digital smartwatch during the tele-exercise class. We measured how much time participants spent in moderate-vigorous physical activity exertion during class to meet national physical activity guidelines for health.

Keywords: *Spinal cord injury; exercise; health; physical activity; wearable device*

Introduction

Regular physical activity is a modifiable behavior that is critical to health maintenance for individuals with spinal cord injury (SCI).[1–4] However, nearly half of individuals living with SCI are sedentary which expedites the development and progression of several secondary health conditions including obesity, cardiopulmonary disease, osteoporosis, heterotopic bone development, pressure ulcers, sleep disorders, and chronic pain.[5] The development and measurement of novel strategies to promote physical activity participation in this population are needed to remedy these health risks. Our team previously developed Tele-Exercise to promote Empowered Movement in SCI (TEEMS), a group program responsive to physical activity access barriers that individuals with SCI experience.[6,7] The program is informed by available exercise guidelines for SCI which emphasize aerobic and strength training to achieve moderate-vigorous physical activity (MVPA) intensity to meet national guidelines for health maintenance.[1,8] Program participation shows promising improvements in physical activity behavior over time[9], but evaluation of during TEEMS is warranted to determine intraclass exertion.[10]

Previously available evidence for physical activity tracking in this population has relied on self-report measures. Self-report measures are subject to response variability, often relating to participant overestimation of behavior.[11] Additionally, health fluctuations with SCI can change self-report as exacerbation of secondary health conditions influence physical activity behavior[1211].[13,14] Further, validated SCI-specific physical activity self-report outcome measures

demonstrate within-subject variability for leisure-time physical activity recall.[9,15] Assessment of physical activity using biophysical measures is important to understand effects of evidence-based interventions aimed at changing this health behavior.

Accelerometry via wearable wrist-worn Actigraph monitors is a viable biophysical measurement method for physical activity tracking in individuals with SCI (fig 1).[16] The device is the size of a smartwatch and allows for ease of access and remote data collection set up.

Figure 1: Wrist-worn Actigraph device

Accelerometry has been used in combination with machine learning models to measure physical activity in this population.[17] Accelerometry has been validated to estimate energy expenditure in individuals with SCI and been compared to validated self-report outcomes such as the Physical Activity Recall Assessment (PARA-SCI).[18–20] Additionally, this method has been integrated into community-based adaptive interventions to provide real time feedback based on physical activity behavior.[21]

With a growing evidence base, the energy expenditure predictions for this population based on accelerometry are few and show varying outputs. This indicates additional work is needed to evaluate physical activity tracking with accelerometry in individuals with SCI and examine additional algorithms to monitor behavior. The Monitor-independent movement summary (MIMS-unit) is an open-source algorithm created to summarize high-resolution raw accelerometry data to estimate physical activity behavior by counts.[22] MIMS-unit allows for assessment of physical activity based on individual perception of exertion. MIMS-unit has characterized total physical activity volume using United States population data[23] and determined an association between movement and cognitive function in older adults.[24] While MIMS-unit offers a potential method to estimate physical activity in individuals with SCI, available evidence for its use in this population warrants further investigation. The purpose of this exploratory study was to describe MVPA behavior during TEEMS program participation using accelerometry and MIMS-unit algorithm. A secondary self-reported exertion rating (RPE) was collected as an acceptable assessment of MVPA in adults with SCI.[25]

Materials and Methods

Participants with chronic SCI (>12 months) volunteered for a non-randomized registered clinical trial [NCT05360719]. The study was approved by the XXXXX Institutional Review Board. The clinical trial evaluated Tele-Exercise to promote Empowered Movement in individuals with SCI (TEEMS), a synchronous group tele-exercise program. TEEMS is designed to strengthen personal factors critical to lifelong physical

activity behavior by overcoming barriers to exercise participation in individuals with SCI.[9] This is achieved through distanced delivery (tele-exercise), expert instruction (co-leadership by a rehabilitation clinician and individual with SCI), peer engagement (group-based learning) and orientation to self-management strategies (goal setting, perceived exertion monitoring, exercise practice).

TEEMS program length, frequency, and duration were informed by exercise guidelines for adults with SCI.[8] TEEMS met biweekly via web communication software over 8-weeks (16 total sessions). Each 60 minute class included a 15 minute discussion and 45 minutes of exercise broken into segments: warm up, shoulder and trunk stability, aerobic training, strength training, and cool down (Figure 2). Additional details on the intervention, its feasibility, and initial outcomes are published elsewhere.[7,9,10]

Component	Description
Segment 1	Welcome and group discussion
Check-in	Diaphragmatic breathing
	Meditation
Segment 2	Neck mobility
Warm-up, 5 min	Shoulder mobility
	Spinal mobility
	Elbows/wrist mobility
Segment 3	*Done in 3 exercise circuits 5 min each*
Cardiovascular	1. Arm jacks
training, 20 min	1. Marches
	1. Cross-body reach
	2. Overhead reach
	2. Side reach
	2. Low reach
	3. Cross Jab
	3. Uppercut
	3. Hook
	3. Speed bag
Weights, 15 min	*Bilaterally or unilaterally with trunk stabilization*
	3 sets of 8
	1. Shoulder shrugs
	2. Lateral raise
	3. Bicep curls
	4. Shoulder press
	5. Rows
	6. Halos
	7. Chops
Cooldown, 5 min	Neck stretches
	Shoulder stretches
	Spinal stretches
	Deep breathing
Checkout	Class reflection
	Goodbyes

Figure 2: TEEMS Class Exercise Checklist

A subset of participants were sent Actigraph GT3X+ accelerometers by mail in Week 6 of the program. [17]Accelerometry data were collected during two comparable 45-minute sessions of the TEEMS program during Week 6-7 for all participants. This data collection timeline was chosen to minimize response variability due to unfamilairy with the program. Participant instructions for accelerometry data collection were completed using a previously established remote protocol.[17] Actigraphs were set up to collect accelerometry data at 60 Hz sampling rate over a 5-day period to capture desired data during class sessions (usually 48 hours apart). Participants were instructed to record their

average perceived exertion using the Rate of Perceived Exertion (RPE) scale, an acceptable measure to assess MVPA for adults with SCI,[25] after each class segment in their program exercise logbook. These included warm up, stability, 3 aerobic circuits, strength, and cool down sections. Self-report of MVPA was determined through individual RPE ratings of "somewhat hard" (RPE $\geq$ 13/20). Participants returned their Actigraph and RPE ratings by mail. Data processing was completed using MIMS-unit[22] which converted raw accelerometry data to summarized acceleration units. Data was manually cleaned to remove MIMS-unit readings outside of the two specified TEEMS class durations. Individual participant RPE ratings of 13/20 or above were linked to timed class segments to establish moderate exertion cutoff for MIMS-unit counts during the exercise sessions. Average MIMS-units for each class segment were calculated by individual participant.

Results

Six adult participants (biological sex: males=2, females=4, average age: 46$\pm$14.0 years) with chronic SCI (injury duration 7-48 years) volunteered and completed the study. Participants reported either cervical (n=2) or thoracic (n=4) level injuries. Participants were classified as active or inactive at enrollment based on responses to the American College of Sports Medicine (ACSM) Pre-participation Health Screening.[26] Please see table 1 for additional demographic details.

Table 1.
Demographic features of participants

ID	Exercise status	Sex assigned at birth	Age (years)	Age at injury (years)	Injury duration (years)	Injury level	Injury severity	Injury cause
A	Active	Male	47	40	7	Thoracic	Complete	MVA
B	Inactive	Female	45	32	13	Cervical	Incomplete	Fall
C	Inactive	Female	65	18	48	Thoracic	Incomplete	MVA
D	Inactive	Female	26	18	7	Thoracic	Complete	GSW
E	Active	Female	57	29	28	Cervical	Incomplete	MVA
F	Active	Male	36	25	11	Thoracic	Complete	MVA

Exercise status determined by American College of Sports Medicine (ACSM) Exercise Readiness Questionnaire
Injury cause: MVA = Motor vehicle accident, GSW = Gunshot wound

Please see table 2 for MIMS-units and RPE ratings by individual participant for each class segment. Participants met or exceeded threshold for MVPA exertion in stability, cardiovascular, and strength training class segments. A trend across all participants emerged demonstrating highest average MIMS-units during cardiovascular training class segments, followed by stability and strength training. Warm up and cool down segments did not achieve threshold for MVPA, demonstrating lowest MIMS-units. Group cutoff scores were not calculated as this study utilized an exploratory sample size for descriptive purposes and usability of MIMS-unit algorithm.

Table 2.
MIMS-units and RPE by class segment

ID	Measure	Warm up	Stability	Cardio A	Cardio B	Cardio C	Strength	Cool down
A	MIMS	17.40	26.2	112.2	74.9	114.1	22.88	14.6
	RPE	6.0	13.5	15.0	12.5	14.5	14.0	6.5
B	MIMS	17.47	19.0	81.3	80.7	75.0	26.30	16.9
	RPE	7.0	14.0	15.0	15.5	15.0	19.0	7.5
C	MIMS	16.24	29.8	63.2	50.0	56.8	21.54	14.4
	RPE	11.0	16.0	15.5	13.5	16.0	14.0	8.5
D	MIMS	20.68	25.6	112.0	100.1	153.2	22.84	18.0
	RPE	9	14.0	13.0	12.5	12.5	13.5	11.0
E	MIMS	17.65	17.4	62.5	68.1	52.3	17.54	164
	RPE	8	14.5	15.5	18.0	17.0	14.0	8.5
F	MIMS	22.88	26.7	96.7	88.0	84.8	24.8	22.4
	RPE	9.5	12.5	11.5	13.0	13.0	13.5	9.5

RPE scores highlighted represent self-perceived MVPA.

Discussion

Our findings indicate that the use of wearable devices to collect accelerometry data during group tele-exercise in individuals with SCI is feasible and appropriate. This is an important first step to increasing the number of empirical studies utilizing wearable devices to measure physical activity in this population. A recent systematic review on wearable devices to measure physical activity in individuals with chronic health conditions did not include any studies with individuals with SCI, despite several other neurological conditions represented.[24] Wearable devices to measure physical activity are also integral to the World Health Organization (WHO) approach to digital health which emphasizes adoption of scalable person-centered strategies to mitigate chronic disease.

The goal of concurrent measurement of self-reported (RPE) and accelerometer-based physical activity exertion is to validate intrasession training intensity. RPE as used in the current study could be used to potentially estimate MVPA cutoff scores in a larger sample. However, these cutoffs may be best utilized to estimate aerobic activity since accelerometer-based thresholds are sensitive to movement-based activities and may not capture resistance-based activities in this population. The comparison of a physiological measure to RPE may be helpful to ultimately yield a more sensitive prediction of MVPA through accelerometry.

Additionally, this work indicates that data processing via MIMS-unit algorithm in group tele-exercise with individuals with SCI is applicable. This adds to the growing body of literature indicating that open-source procedures allows for transferability of findings to implementation science settings and to end-users.[20] Since MIMS-unit analysis increases standardization of data cleaning and analysis to estimate physical activity behavior, its

transferability across devices has a unique advantage. MIMS-unit should be further explored as a data processing method in future studies to estimate physical activity intensity in individuals with SCI.[20]

This study findings are limited due to an exploratory sample for descriptive and feasibility purposes. Future studies to determine MIMS-unit thresholds and ranges for physical activity intensity should include additional participants. Our study included individuals with SCI with varying exercise readiness. Future studies using accelerometry to estimate exertion during a specific physical activity intervention may want to analyze participants by active and non-active groups for a more specific estimation of intensity by exerciser status. Additionally, personalization of thresholds might allow for more tailored interventions.

Accelerometry-based physical activity tracking during group tele-exercise for individuals with SCI is appropriate. The MIMS-unit algorithm is a viable strategy to process the amount of physical activity and may be used in conjunction with a self-reported exercise intensity rating. This work described intrasession training intensity for group tele-exercise and demonstrates feasibility of accelerometry-based physical activity tracking during group tele-exercise in this population.

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Conflicts of Interest

The authors report no conflicts of interest.

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Statement of Contributions

Dr. Laura Baehr was responsible for design, data collection, data analysis, and manuscript preparation. Dr. Shivayogi Hiremath contributed to design, data analysis and manuscript preparation. Dr. Margaret Finley contributed to design and manuscript preparation.

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SYSTEMATIC REVIEW
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The Effect of Collaborative Patient Simulation in Health Education Students: A Critically Appraised Topic

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Due to the complex health issues of patients, and concerns with the quality of care, there is a need for more effective and well-organized healthcare. The National Academy of Medicine includes "work in interdisciplinary teams" as one of the core competencies to improve patient care and address concerns plaguing the healthcare system.[1] It is imperative that all healthcare providers possess the ability to cooperate, communicate, and collaborate with others.[1] However, negative attitudes towards other professions, lack of interprofessional training, and decreased communication can undercut the interdisciplinary approach.[2,3] One way to prevent this is to promote training or retraining of various professionals on the importance of collaborative communication and teamwork.[2]

Health professions graduates will enter the workforce with the expectation of working in these interprofessional healthcare teams, and interprofessional education is a way to prepare them for encounters.[2] Collaborative learning with students focusing on core interdisciplinary skills has shown positive outcomes.[2,3,4] Interprofessional education (IPE) is a set of educational activities that enable professionals to gain an understanding of, learn from, and collaborate to enhance partnership and quality of care.[4] Simulation-based learning encourages collaboration, interaction with other professions, and team-based decision-making.[3]

Because of the theory of situated learning, which states that learning occurs through social interaction and cooperation among peers, the learner's environment, and genuine learning practices, the evaluation of student perception is pertinent.[5] One reliable and valid evaluation method is the Students' Perceptions of Interprofessional Clinical Education-Revised (SPICE-R).[6] It is a 10-item self-report comprised of three subscales: interprofessional teamwork and team- based practice (two items); roles and responsibilities for collaborative practice (two items); and patient outcomes from collaborative practice (six items).[5] The instrument is scored from 1-5, from strongly disagree to strongly agree.[5] While it is known that interprofessional education in health education curriculum improves students' attitudes toward other health professions and collaborative teamwork, implementation challenges exist.

Focused Clinical Question

What is the efficacy of collaborative patient simulation for changing attitudes about interprofessional collaboration in healthcare students?

Search Strategy

A search of PubMed and CINAHL was conducted in June of 2023 following a PIO strategy to evaluate the question.

- **P**atient group: Undergraduate or graduate healthcare students
- **I**ntervention: Interprofessional education activity
- **O**utcome: Scores on SPICE-R

The following Boolean phrases were used:

- Interprofessional education
- Interprofessional education AND athletic training
- Interdisciplinary AND healthcare education
- Interprofessional education AND simulation training AND SPICE-R

Inclusion criteria were:

- Studies that included the SPICE-R instrument for student feedback
- Studies that included a simulation of interprofessional activity
- Studies with 2 or more undergraduate or graduate health professional groups that were engaged in an interprofessional activity
- Limited to the last 5 years

Exclusion criteria were:

- Studies where the IPE simulation was performed electronically or if a simulation was not performed (passive learning)
- If numerical data supporting the findings of the study were not provided

Evidence Quality Assessment

Each included article was appraised to assess for internal and external validity concerns. The JBI Critical Appraisal Checklist for Quasi-Experimental Studies was used to critically appraise non-randomized experimental studies.[7] This critical appraisal tool is a 9-question checklist with the reviewer responding to each question with a yes, no, unclear, or not applicable.[7] Cohort studies were assessed using the STROBE checklist.[8] The STROBE is a 22-item checklist and is scored by the number of items that are correctly reported, divided by the number of items that need to be reported and presented as a percentage.[8] For both appraisal methods used, a higher score indicates higher methodological quality.

Results of Search

Summary of Search, Evidence Appraised, and Key Findings

In total, this search yielded 121 records from PubMed (Figure 1). Each article was then reviewed for inclusion of simulation training between at least two different professions, which yielded 15 relevant articles. The articles were then further assessed for inclusion of the SPICE-R, which resulted in six articles. Finally, the results section was evaluated to check for numerical data stating the significant change levels in SPICE-R scores. The three articles in Table 1 met the inclusion criteria and demonstrated an improved perception of IPE simulation-based activities.[3,6,9]

Figure 1 – Search Results

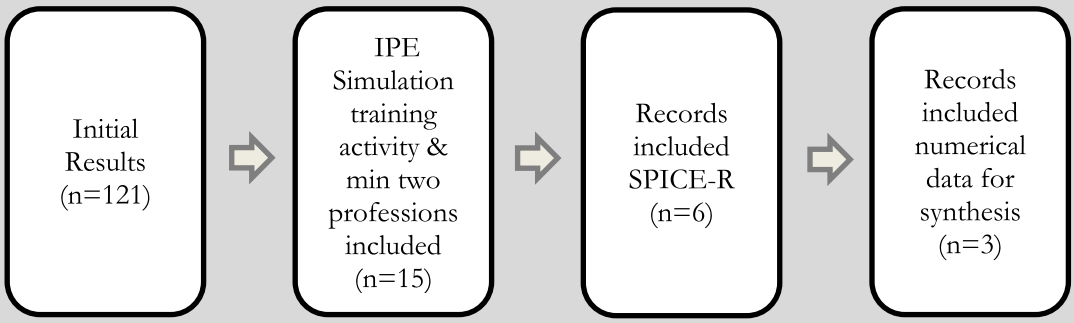

Table 1.
Characteristics of Included Studies

	Study		
Author(s)	**Carmack et al.[9]**	**Morrell et al.[6]**	**Fusco et al.[3]**
Study title	Interprofessional diabetes escape room with nursing and athletic training students	Interprofessional education week: The impact of active and passive learning activities on students' perceptions of interprofessional education	Measuring changes in pharmacy and nursing students' perceptions following an interprofessional high-fidelity simulation experience
Study participants	Athletic training students (n=18), Nursing students (n=16)	Athletic training (n=29), Nursing (n=80), Occupational Therapy (n=51), Physical Therapy (n=10), Public Health (n=12), Other (n=8)	Pharmacy students (n=133); Senior Nursing students (n=121)
Inclusion/ exclusion criteria	Senior level undergraduate nursing students and entry-level graduate AT students	Exclusion: students who did not complete both pre and post-IPE Week assessments	Inclusion: third-year pharmacy students and senior nursing students

			Exclusion: Students who did not complete the post-survey
Outcome measures	SPICE-R survey pre and posttest	SPICE-R survey pre and posttest	SPICE-R survey pre and posttest
Results	SPICE-R was statistically significant for improvement in scores in all three IPE factors after participating in the Diabetes Escape Room. Separate scores for both professions showed significant improvement in *roles/responsibilities for collaborative practice* and *patient outcomes from collaborative practice.*	N=190 students 80.5%--attended an active learning event 19.5%--attended a passive learning event Significant increase in perceptions of IP healthcare for all 3 factors (p<.001) Passive learning groups had a statistically significant increase in 2/3 factors: (p=.021) roles/responsibilities and (p=.016) patient outcomes from collaborative practice. Active learning group--statistically significant change in SPICE-R (p<.001) Change pre to post IPE Week passive and active learning events--(p=.035)	N=104 (pharmacy) and 93 (nursing) Median score increases were seen for all SPICE-R items (p<0.01) for pharmacy and 9 of the 10 items (p<0.01) for nursing students.
Evidence Quality Assessment	JBI CAC 7/9	STROBE 19/22	STROBE 20/22
Support for the answer	Yes	Yes	Yes

Results of Evidence Quality Assessment

Two studies were assessed using the STROBE checklist. The Fusco and Foltz-Ramos[3] study received a score of 20/22 and the Morell et al.[6] study received a score of 19/22. Each study lost points for not including potential sources of bias or funding sources. There was also a point deduction for Morell et al.[6] due to not reporting other analyses performed. Both cohort studies had a Strength of Recommendation Taxonomy (SORT) level of evidence of 2.[10] The third study, Carmack et al.,[9] was assessed using the JBI Critical Appraisal Checklist for Quasi-Experimental Studies and scored a 7/9. Points were deducted for not including a control group and a lack of clarity when providing details concerning if the participants in comparisons were similar. It had a SORT level of evidence of 2.[10]

Clinical Bottom Line: Strength of Recommendation

Consistent evidence supports the use of collaborative patient simulations to improve attitudes about interprofessional collaboration. Morell et al.[6] concluded that student perceptions of interprofessional healthcare increased significantly for each of the three SPICE-R criteria. Fusco and Foltz-Ramos[3] discovered that nursing and pharmacy students demonstrated significant increases in all or most elements of the SPICE-R following a high-fidelity simulation, demonstrating the potential effectiveness of performing experiential learning. Carmack et al.[9] found that the SPICE-R scores significantly improved after students participated in an Escape Room simulation. Most studies demonstrated that students' perceptions of interprofessional clinical education were high at baseline but increased after the IPE activity. Simulation is a valuable educational tool to enhance interprofessional clinical education and collaboration. The SORT Strength of Recommendation Grade is B.[10]

Implications for Practice, Education, and Future Research

The results of this critical appraisal demonstrated that students responded positively to interprofessional collaboration as measured by the SPICE-R. The active simulation activities resulted in significantly higher post-scores in all the factors of the scale: roles and responsibilities, team-based practice, and patient outcomes. As a result, when educators are developing and planning IPE activities, they should consider including active learning scenarios that involve interaction with other health professionals.[6] If choosing to do an interprofessional escape room, it was found that this method could be applied to any topic area with various health professionals.[6,9] While there were improvements in perceptions of IPE after the activity, all three studies did not have a control group to compare pre and post-tests.[3,6,9]

There are several challenges with IPE, which can include programs housed across academic departments and different educational levels (e.g., bachelor's, master's, post-professional), with some programs lacking experience with professional collaboration.[4] It is believed that these challenges could be due to the lack of support from the department in which the program is housed or the institution's lack the readiness structures.[4] Another challenge that programs face is the lack of resources and time to encourage collaborative learning and the availability of ample group space.[11] Accurately matching student knowledge of learning poses a challenge when evaluating student levels for a comparable experience and result.[9] Educators must consider not only the level of exposure to IPE, but also students' clinical and healthcare knowledge, skills, and abilities.[9] Additionally, the timely formulation of outcome measures within the framework of strategic planning can inform the assessment techniques and ensure that all expectations are fulfilled for each discipline.[11]

As stated by several studies,[3,6] future research is needed to identify if the positive student perceptions of other professions acquired through IPE activities continue after graduation into their careers. With IPE simulation activities becoming more prevalent in health professional programs, further research into which type of simulation provides the best improvements in SPICE-R scores and meeting learning outcomes is needed. IPE activities that involve multiple sites or opportunities for exposure allow students to learn from and collaborate with the different professions versus a single-site scenario. Additionally, in the time since when the included studies were published[3,6,9] the SPICE-R was updated to SPICE-R2 (2022)[12] and needs to be used in future research. In the updated version, the introduction paragraph to the student includes additional professions as part of the healthcare team.[12] The wording of the ten items was changed to include patient satisfaction over patient outcomes, as well as the education of the student to establish collaborative

relationships.[12] Finally, more information is needed regarding patient satisfaction, experiences, and outcomes when treated by healthcare professionals who have been specifically trained in IPE.

CAT Expiration Date

CATS have limited life and should be revisited approximately 2 years after publication.

Conflicts of Interest

None of the authors reported any conflicts of interest.

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The Crucial Role of Campus Sexual Violence Advocacy Programs: A Call for Implementation and Research

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Campus sexual violence (SV) has emerged as a significant public health concern in the United States (Mellins et al., 2017), demanding comprehensive interventions within higher education institutions. In 2014, the White House Task Force called for efforts to better identify and prevent this issue, spurring increased attention to violence prevention and response on college campuses (Senn et al., 2018). In response, campus advocacy programs have become pivotal in supporting survivors and fostering safer environments.

Campus sexual violence (SV) advocates play a vital role in supporting survivors and fostering safer academic environments. These trained professionals or peer supporters provide confidential assistance, crisis intervention, and ongoing support to survivors of SV on college campuses. SV advocates serve as a crucial link between survivors and the often-complex Title IX process, offering guidance, emotional support, and empowerment (Wood et al., 2021). The services provided by campus SV advocates are comprehensive and multifaceted, including confidential support and counseling for survivors, assistance in navigating the reporting process and legal systems, coordination of medical care and forensic exams, advocacy for academic accommodations, referrals to on campus and community resources, and education and prevention programs for the campus community. By collaborating with campus officials and students, advocates develop and implement policies and protocols that prioritize survivor well-being and ensure a trauma-informed approach to prevention and response (Wood et al., 2021).

The potential impact of SV advocacy programs is significant, given the prevalence and consequences of campus sexual violence. Approximately 13% of college students report experiencing rape or sexual assault, with higher rates among undergraduate women (25.9%) and gender nonconforming students (22.8%) compared to cisgender men (7%) (Cantor et al., 2020). Survivors often experience multiple forms of psychopathology, including PTSD, depression, anxiety, increased suicide risk, disordered eating, and substance abuse (Dworkin et al., 2017). A large-scale study found that compared to non-victims, survivors reported significantly higher rates of loneliness, hopelessness, difficulty functioning, overwhelming anxiety, and sleep problems (American College Health Association, 2016). Moreover, a systematic review on the impact of

campus SV on educational outcomes revealed that across all studies, sexual assault was associated with more academic problems including lower grade point average, dropping out of university, and self-regulated learning problems (Molstad et al., 2023). These impacts underscore the critical need for SV advocates.

While anecdotal evidence strongly supports the positive impact of advocacy services, there is a striking lack of empirical research evaluating their effectiveness. This gap in research is particularly concerning given the widespread implementation of these programs and their potential to significantly influence survivor outcomes. Limited available studies show promising results. Recipients of advocacy services report less violence exposure over time (Voth Schrag et al., 2024), and survivors indicate that advocates help mitigate barriers to seeking support by improving awareness of resources and addressing fears of judgment (Dills et al., 2016). However, more comprehensive research is urgently needed to fully understand and optimize the impact of these programs.

We call for immediate action on multiple fronts to implement SV advocacy programs. Institutions of higher education should prioritize the establishment and expansion of high-quality, evidence-based campus SV advocacy programs, ensuring they are well-resourced and integrated into the campus support framework. We urge researchers, institutions, and funding bodies to conduct rigorous evaluations of campus SV advocacy programs, including a range of methodologies from quantitative outcome studies to qualitative investigations of survivors' experiences, with a particular emphasis on longitudinal research to understand long-term impacts. Additionally, policymakers should work to create and enforce high-quality ethical standards for campus SV advocacy programs. As survivors ourselves, we understand the profound impact of SV on college students' holistic health. By investing in both the implementation and evaluation of campus SV advocacy programs, we can create safer, more supportive environments for all students while contributing to evidence-based practices in campus sexual violence prevention and response. The time for action is now – to support survivors through advocacy programs and to conduct the necessary research to refine and improve these crucial interventions.

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Social Isolation and Loneliness in Persons with Obesity

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Presently, over 40% of Americans carry approximately 30 to 40 extra pounds of body weight, leaving them meeting the criteria for obesity[1]. Another 30% of Americans are overweight and at risk to meeting the criteria for obesity if they gain weight. Obesity impacts individuals from underserved groups, in both urban and rural settings, at higher rates than seen in persons who live in neighborhoods and communities with greater resources to promote health and weight control[2]. Underserved neighborhoods are far less likely to have grocery stores to purchase fresh fruits, vegetables, meats and dairy products; they are less likely to have safe and clean green spaces to promote physical activity[3-4]. By contrast, more well served neighborhoods typically include grocery stores, usable public areas, and health care resources to promote the health and well being of those who live there.

While many people think of extra body weight as an aesthetic issue, obesity is associated with over 200 medical conditions and diseases which impact essentially every system of the body in some manner[5-9]. Obesity not only impacts morbidity it also impacts mortality. While the decrease in life expectancy seen in Americans since 2020 is typically attributed to the COVID-19 pandemic, life expectancy has not returned to pre-pandemic levels, something that many experts are attributing to obesity[10-12].

Carrying extra body weight is not only a physical burden, but also a psychosocial one[13]. Many individuals with obesity report low self-esteem and quality of life. In a culture that celebrates thinness and muscularity as influential markers of physical attractiveness, these relationships are not that surprising. We also know that obesity can come with social consequences as well. Persons with obesity are more likely to be single and typically report smaller social networks[14-15]. Interestingly, obesity also appears to have a "contagion" effect, that persons with obesity are more likely to have persons in their social network who have obesity[16-17].

While the impact of bodyweight on social relationships may seem trivial at first glance, new evidence suggests it's far from it. In a study over almost 400,000 individuals in the UK Biobank, adults with obesity who reported more social isolation and loneliness were at an increased risk of all-cause mortality[18]. More simply put—the combination of obesity, social isolation, and loneliness can contribute to an early death.

Social isolation and loneliness may seem like two words for the same thing, but they are different. Social isolation refers to a lack of social connections[19]. People who are socially

isolated have few social contacts. In contrast, loneliness is the feeling that one's social connections are inadequate to one's needs[20]. However, it is more than an emotionally negative experience. As this study suggests, it also can impact health and contribute to early death.

How can a person with obesity address social isolation and loneliness? One way to address social isolation is to increase the amount of time you are out in the world and around people. Spending more time with family and friends is a start. Social pleasures among humans, such as eye gaze, touch, and attachments have been asserted to be a source of basic sensory pleasure[21] and social relationships are one of the most important factors in human happiness[22]. However, even being in public places and having brief, casual interactions with others, such as exchanging a few nice words with the person at the cash register, can help[23]. These small, seemingly insignificant social interactions keep us practiced in treating each other with mutual trust, creating shared purpose and bond us socially.

Loneliness can be more difficult to address, as we can feel lonely even when we are around others. To combat loneliness, we like to focus on strategies that enhance "mattering." Mattering results from social information that one is valued and needed by others and that one adds value to their world[24-25]. People who feel like they do not matter can experience a sense of social exclusion contributing to feelings of numbness, a focus on the immediate present, inaction, reduced self-agency, and overall sense of worthlessness[26].

Although it is important to be valued, adding value is just as important. Engaging in opportunities to 'give back' can provide a sense of meaning and purpose as well as opportunities to make meaningful connections. When people feel like they matter, they are more likely to contribute to the well-being of themselves and others.

Conditions that lead to people with obesity to experience greater social isolation and loneliness are socially created. A culture of mattering fosters conditions in which people feel valued and can add value, and prevent conditions in which people feel devalued, incapable and powerless. It can also mitigate the experience of social isolation and loneliness, an important aspect of quality of life and the human experience for just about everyone.

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