INTERVENTIONS

Openness to Using an External Penile Prosthesis for Maintaining Sexual Intimacy by Individuals with Erectile Dysfunction: A Cross-Sectional Study

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ABSTRACT

Introduction: Erectile dysfunction (ED) can lead to reduced sexual intimacy in men. The external penile prosthesis (EPP) is a device to help them participate in penetrative sex.

Aim: We investigate factors that may affect the willingness of individuals with ED to try an EPP and explore how the EPP could be presented most effectively to such patients to enhance their willingness to try an EPP.

Methods: Recruitment for this cross-sectional study occurred in-person and online. 147 participants (60.0 ± 14.3 years old; all experiencing self-reported ED) completed a survey containing both validated measures and questions specific to this study. The survey was open to English-speakers over the age of 18 who self-reported experiencing ED.

Main Outcome Measure: The primary outcome was participants' willingness to try an EPP based on their level of knowledge about using the EPP. Secondary outcomes included the influence of the sexual function, sexual distress, ED history, age, relationship duration, sexual flexibility on willingness to try an EPP. We also collected feedback from participants' on how and where they would like to be introduced to the EPP option.

Results: Most participants indicated a preference for being introduced to the EPP after trying some ED treatments (51.0%). Participants did not have strong preference regarding the setting where they were informed about the EPP. The majority however preferred having a sexual health therapist/counsellor (28.6%) or physician (25.9%) as the person introducing the EPP to them. Participants' willingness to try the EPP increased with more information about the EPP presented to them ($P < .001$). Personalization of the EPP to match one's own penis was preferred by 38.7% of participants. Referring to this aid as an *'external penile prosthesis'* was significantly more preferred over alternative labels, such as a "belted prosthetic phallus" or "strap-on dildo" (Ps $< .001$ for both). Multiple regression analyses showed that only sexual script flexibility was associated with the initial willingness to try an EPP ($P < .01$).

Clinical Implications: Clinicians should consider presenting the EPP to men with ED, who desire maintaining penetrative sexual intercourse with their partners.

Strength and Limitations: This is the first study to explore factors influencing the willingness to try an EPP. Further research is needed to establish the efficacy of EPPs for maintaining sexual activity and satisfaction in the real-life setting.

Conclusion: This study informs clinicians about effective ways to introduce the EPP to patients with ED who wish to maintain insertive/receptive sex. **Fu F, Duthie CJ, Wibowo E, et al. Openness to Using an External Penile Prosthesis for Maintaining Sexual Intimacy by Individuals with Erectile Dysfunction: A Cross-Sectional Study. Sex Med 2022;10:100559.**

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INTRODUCTION

Erectile dysfunction (ED) is commonly understood as the "inability or marked reduction in the ability in men to attain or sustain a penile erection of sufficient duration or rigidity to allow for sexual activity".[1] A diagnosis of ED requires a functional deficiency accompanied by psychological distress.[2]

ED severely compromises patients' ability to have satisfactory sexual intercourse and for many, is strongly associated with frustration, embarrassment, and a feeling of emasculation.[3] ED patients have difficulty seeking medical support due to embarrassment and the condition is associated with psychological morbidities such as anxiety and depression.[4,5] ED may distress not just patients but their sexual partners, contributing to relational strain and reducing the quality of life for both.[6]

First line treatment for ED includes phosphodiesterase-5 inhibitors (eg, Viagra, Cialis, Levitra), while second-line treatments include vacuum erection devices (VED) and intracavernous injections (ICI).[2,7–9] Failing this, a surgically implanted penile prosthesis remains an option.[10]

These treatments have limitations and their effectiveness in restoring an erection firm enough for penetrative sex varies. Long-term adherence rates for ED treatments are low, with close to 75% of patients ceasing use of these various erectile aids within the first year due to dissatisfaction and frustration.[11]

Aside from these treatments, those experiencing ED have used other strategies to stay sexually active.[12] One option, as an alternative to ED treatments, which has not been formally investigated, is the use of an external penile prosthesis (EPP), more commonly known as a strap-on dildo. This is a phallic replacement fastened to a harness worn around the hips. The potential of EPP to help men with ED recover sexual satisfaction was first suggested by Gray and Klotz.[13] This was further discussed in a case study presented by Warkentin et al[14] of a man, who had severe ED due to prostate cancer treatments include androgen deprivation therapy, but was able to achieve satisfactory orgasmic sex with his female partner while using an EPP.[13,14]

Using an EPP for penetrative sex may have several advantages over standard ED treatments. For example, an EPP is relatively simple to use, inexpensive, non-invasive, with no pharmacological side effects. Furthermore, the EPP can in theory be customized to match the size, shape, stiffness, and angle of a normal erect penis, as well a partner's preference. Additionally, it can permit full body contact as occurs with normal coitus. This can allow the man natural hip kinematics, rhythmic movements, and embrace that may not be possible with less than perfect ED treatments. An additional advantage of the EPP, is that it can help alleviate performance anxiety related to pressure to maintain an erection. This can help the patient avoid loss of confidence.[5] The EPP can facilitate penetrative anal sex whereas ED treatments are often not sufficient in restoring erections firm enough for anal penetration.

Contrary to common belief, sexual intercourse with an EPP does not preclude genital stimulation to the wearer of the EPP and it is well established that erections are not necessary to achieve orgasms.[15] As documented by Warkentin et al[14] the partner of a man wearing the EPP can provide direct stimulation to the flaccid penis, which are external to the EPP. By holding the penis with lubricant in their hand, the partner can stimulate the penis in rhythm with the patient's normal hip movements, duplicating the stimulus he would receive during normal penetrative sex. Warkentin et al[14] suggests that the combined penile stimulation and normalcy of the full body posture and movements contributes to multi-sensory integration which culminated in orgasm for both the man using the EPP and for his partner.

It is our impression that EPPs are rarely recommended by clinicians to patients with ED as an alternative to ED treatments. This may be in part due to EPP's marketing as a sex toy rather than a medical treatment. However, research demonstrates low introduction rates of non-pharmacological treatments in general.[16] It is possible that there is poor awareness of such strategies within the clinical setting, or that clinicians may feel such strategies are out of the scope of their practice.

The EPP may also be overlooked as an option by the patients themselves. In a recent study, 97% of prostate cancer patients reported they had never tried an EPP for sexual intimacy.[12] Only 14% of these non-users indicated that they were open to trying an EPP with 72% simply stating that the device did not appeal to them.

In this paper, we aim to investigate the attitudes of individuals with ED, and their partners, toward the possibility of trying the EPP. This was done via an anonymous online survey directed to individuals who experience ED. We explore whether the willingness of ED patients to try the EPP is influenced by how the device is introduced to them. We thus investigate participants' preference for how, by whom, when, and where the device should be introduced to individuals with ED. Currently, there is a lack of information on how/when health professionals should

introduce non-medical sex aids, and which (if any) patient demographic and psychological factors are associated with a greater willingness to try the EPP as an alternative to standard ED treatments. We also examined the influence that information about the neurobiology and kinematics of coital sex with an EPP has on the willingness of both patients and partners to try the EPP.

Our research questions are:

1. Does willingness to use an EPP increase as more information is provided about how the EPP functions?
2. What factors are associated with increased willingness to use an EPP?
3. How can clinicians introduce the EPP effectively to patients?

MATERIALS AND METHODS

Recruitment

Recruitment for this cross-sectional study occurred online and in person through a poster advertisement containing a QR code/URL link direct to the online questionnaire. Participants were recruited internationally through prostate cancer support groups, social media posting in communities aimed at addressing sexual health, and through the in-person and online clinical practices of several sexual health clinicians. Inclusion criteria stipulated participants must be fluent in English, over age 18, in a sexually intimate relationship, and be experiencing erectile difficulty. Because effective use of the EPP requires a partner's willingness to use the sex aid, patients were encouraged to take the survey along with their partner and discuss their collective responses before answering the questions. While partner participation was preferred, it was presumed that it would not be possible for all participants and therefore was not required. The survey was posted online using the Qualtrics platform and was available for responses from June 2020 to June 2021. The study protocol was approved by the Conjoint Health Research Ethics Board, University of Calgary (REB20-0101). All participants provided written informed consent. After submitting completed surveys, participants were directed to a separate website and given the option to enter an email address for a prize draw of a $25 VISA gift card.

Outcome Measures

Demographic Information. The demographic survey, designed for this study, included a standard demographic questionnaire assessing gender identity, age, education level, annual combined household income, country of residence and sexual orientation.

Partner/relationship Information. Participants were asked if they were in a committed relationship, their partner's age, gender, education level and length of the relationship. Participants were also asked if they invited their partner to help complete the survey and if their partner was willing to participate.

Sexual Difficulty. Characteristics of the participants' ED and treatment were queried using questions developed specifically for this study. This included questions about whether the participant experienced ED, the proportion of the time they experienced ED during masturbation or sex with a partner, whether ED prevented them from being able to have penile-insertive sex, and the perceived importance of penetrative intercourse for both the patient and the partner. To capture information confirming an ED diagnosis, participants were asked if they were distressed by ED and had been diagnosed with ED by a health care provider. Since many factors can lead to ED, participants were asked to report their understanding of the primary cause of their ED, as well as how long they had experienced ED and whether they had already received treatments for ED.

Sexual Health Inventory for Men (SHIM). The SHIM is a standardized measure that assesses the severity of patients' ED.[17] Patients were asked 5 questions: (i) how confident they were in getting and keeping an erection, (ii) how often were their erections hard enough for penetration when sexually stimulated, (iii) how often were they able to maintain their erection after they had penetrated their partner in sexual intercourse, (iv) how difficult was it to maintain their erection to the completion of intercourse, and (v) when attempted sexual intercourse, how satisfactory was it for them. Each question was measured on a scale of 1−5, with higher score representing better sexual function. Scores from each of these items were summed for a total sexual function score.

Sexual Distress Scale − Short Form (SDS-SF). This scale was recently validated for use with men and women, and for clinical and non-clinical samples.[18] The SDS-SF is a short form of the Sexual Distress Scale.[19] The SDS-SF consists of 5 questions assessing how often participants were distressed about their sex life, frustrated by their sexual problems, stressed about sex, worried about sex, and distress from being sexually inadequate. This was measured on a scale ranging from 0 (never) to 4 (always). Scores from each of these items were summed for a total score on sexual distress.

Sexflex Scale. The 6-item Sexflex was used to assess sexual script flexibility; ie, participants' willingness and ability to change their approach in sex when faced with sexual difficulties.[20] Items were measured on a 1−4 Likert scale, with 1 and 4 representing lower and higher patient sexual script flexibility. Scores from each of these items were summed for a total score on sexual script flexibility.

ED Treatment Information. This section inquired about past use of ED treatments and patient opinion on using the EPP as a way to remain sexually active with their partner. The questions were presented in a 9-step progressive format that providied

increasing information about the EPP as an alternative to standard ED treatments.

Step 1 queried participants about experience with ED treatments, including oral medications (such as Viagra), VED, ICI or surgical penile implant. The response answers for each strategy were "yes" or "no."

Before proceeding to Step 2, participants, who were in a relationship, were asked to confirm if their partner was also completing the remaining steps with them.

Steps 2–4 queried participants about their willingness to try an EPP, when additional information was presented successively in blocks to them (Table 1). First, the EPP was introduced as an alternative to ED treatments for sexual intimacy, and participants' comfort to try to an EPP was assessed (*step 2*). Responses were measured via a 0–6 scale, ranging from "not comfortable at all" to "very comfortable." Following this assessment, 2 blocks of information about how to use the EPP were presented (Table 1). After each was presented, willingness to try the EPP was reassessed with possible responses ranging from "not likely at all" to "very likely" (*steps 3–4*).

Steps 5–9 queried participants about what they considered the most appropriate clinical context for introducing EPP to patients. Participants were asked about their preferences in: (i) timing relative to a patient's experience of ED in general, (ii) location where the introduction should be made, (iii) qualifications of the person providing the information, and (iv) timing relative to their own experience of ED. Participants were also asked about the degree to which they preferred a personalized EPP that accurately matched their own erect penis, in terms of appearance (eg, shape, size, color). Lastly participants were asked to rate how acceptable alternative names for the EPP were to them.

Data Analysis

Data were analyzed using SPSS statistical software (IBM, version 27). Missing data for descriptive statistics were listed on the tables. Descriptive analyses were used to summarize demographic data, participants' ED experience, and participants' preferences on clinical application of the EPP. A one-way repeated measures ANCOVA was used to determine if participants' willingness to try an EPP changed before any information (step 2) and after 2 consecutive sets of information about the EPP were presented to them (steps 3 and 4), while controlling for partner's participation in the study. A one-way ANCOVA was used to indicate any differences in the name preference for EPP, while controlling for partner's participation in the study. Bonferroni post hoc corrections were used ($P < .017$). Pearson's correlation was performed to determine the association between the initial willingness to use EPP (after information block 1 was given, ie, step 2) and selected measures. The selected measures we assessed were age of participants, sexual orientation, partner participation in the survey, length of relationship, SHIM total score, SDS total score,

Table 1. Information given in each information block for steps 2-4 before assessing patient willingness to use EPP

Information block 1	"The following option is not considered a medical device and is not typically prescribed by doctors. This option is to use an external penile prosthesis (also known as a strap-on dildo), where the prosthetic (ie, the dildo) is inserted into the man's partner, rather than the man's penis. The prosthesis is a sexual toy in the shape of a penis that attaches to a harness worn around the man's waist and upper thighs. The prosthesis is available in a wide variety of sizes. The harness holds the prosthesis in the proper orientation and angle of an erect penis. The man's penis then sits below the prosthesis"
Information block 2	"Many men presume that using an external penile prosthesis would not be particularly rewarding for them specifically because it is not their penis that is in direct contact with their partner, but rather the prosthesis. However, when the man's partner holds on to the man's penis with their hand, while the prosthesis is inserted into the partner, both the man and his partner can simultaneously receive genital stimulation. That stimulation can be rhythmic along with his pelvic movements during penetrative intercourse. Men have reported that the sensation feels very much like natural and normal penile-vaginal or penile-anal intercourse."
Information block 3	"Although it may seem unnatural that using such a prosthesis can lead to rewarding sex for a couple, there is a neurobiological explanation for why this strategy can be sexually rewarding for not just the partner, but also for the man himself. This is based on a concept known as multi-sensory integration. When a couple uses an external penile prosthesis, their bodies are in contact like they would be during normal penile-vaginal or penile-anal sex. The pelvic movements are the same, their bodies are pressing against each other in the same way, and what they see, smell, and hear can be the same as normal penile-vaginal or penile-anal sex.
	Because his penis is being stimulated by his partner, and their bodies are engaging in the same familiar movements of intercourse, men have reported that the overall sensations feel very much like normal intercourse. The brain is able to integrate all of the sensations typically present during sex to create a natural feeling experience for both the man and his partner. There are reports of both partners experiencing full, normal orgasms while using the external penile prosthesis."

Sexflex total score, perceived importance of penetrative intercourse to partner, importance of penetrative intercourse to the participant, and the history of participants having received ED treatment(s).

A multiple linear regression was performed, where the dependent variable was willingness to try the EPP after information block 1 (ie, the response for step 2). This baseline time was selected, because the aim was to better inform clinicians about who they may approach to introduce the EPP as a treatment option. A total of 10 variables were entered into the model were the same ones used in the Pearson's correlation. The significance level was $P < .05$.

RESULTS

In this study, 256 people opened the survey link, and 247 consented to the study. From there, 147 participants completed the survey sufficiently to be included in the analysis. The degree of completion of the survey sufficient for analysis was determined by whether the participant progressed far enough into the survey (ie, ≥58% completed) to respond to questions deemed necessary to answer the primary research question. A total of 109 participants were removed as responses were (i) incomplete (only a few items completed), (ii) duplicates (as indicated by IP address), or (iii) did not experience ED. The response rate of surveys sufficiently complete for analysis was 57.4%. We were not able to determine the number of people who saw the study advertisement but did not chose to participate. A total of 92 (62.6%) partners helped participants completed the survey.

Sociodemographic Characteristics

As shown on Table 2, participants included 147 individuals aged 60.0 ± 14.3. The majority identified as male (94.6%) and with a heterosexual orientation (91.2%). A small minority of participants indicated they were female, and recruitment did occur in a setting that included transgender participants. Most participants were highly educated (ie, 67.3% college graduate or higher level of education), and the majority (44.9%) earning an annual household income of more than $100,000. The majority were residents of Canada (42.9%) or USA (37.2%). Of the participants, 92.5% were in a relationship with the mean duration of 29.7 years, ranging from 0.5 to 60.8 years. Partners were mostly female (92.6%) and, similarly to participants, the majority (53.8%) had an education level equal to or higher than college graduate.

Experience of Erectile Dysfunction

As shown on Table 3, of the participants in this study, 100% reported experiencing ED. Among these, 70.7% of participants had their ED diagnosed by a health care provider and 68.7% had previously received treatment. Previous treatments rates are as follows: oral medication (87.1%), VED (45.6%), ICI (35.4%),

Table 2. Sociodemographic characteristics of participants

Variables	N	%	*M*	*SD*	Range
Age			60.0	14.3	21–82
Gender					
Male	139	94.6			
Female	6	4.1			
Other*	2	1.4			
Education					
Grade school or less	1	.7			
Some high school/ technical school	8	5.4			
High school/technical school graduate	17	11.6			
Some college	21	14.3			
College graduate	44	29.9			
Graduate or professional school after college	55	37.4			
Missing	1	.7			
Annual combined household income					
Less than $10,000	4	2.7			
$10,000–$30,000	10	6.9			
$30,001–$100,000	65	44.2			
More than $100,000	66	44.9			
Missing	2	1.4			
Country					
USA	55	37.4			
Canada	63	42.9			
Other†	28	19.0			
Missing	1	.7			
Sexual orientation					
Heterosexual	134	91.2			
Gay/Homosexual	6	4.1			
Bisexual	5	3.4			
Missing	2	1.4			
In a relationship	136	92.5			
Partner age			57.7	14.1	20–80
Partner's gender					
Female	126	92.6			
Male	10	7.4			
Relationship duration (y)			29.7	23.2	0.5–60.8
Partner education					
Some high school/ technical school	9	6.1			
High school or technical school graduate	25	17.0			
Some college	23	15.6			
College graduate	41	27.9			
Graduate or professional school after college	38	25.9			
Missing	11	7.5			
Partner participated in study	92	62.6			

*Intersex, Non-Binary, Transgender male.
†Australia, Austria, India, Ireland, New Zealand, Pakistan, Portugal, South Africa, Switzerland, UK.

Table 3. Patient experience with ED and ED treatments

Variables	N	%
Proportion having experienced ED	147	100
Proportion having received treatment for ED	101	68.7
Proportion of people who had tried ED treatments:		
Oral medication (eg, Viagra)	128	87.1
Vacuum erection device	67	45.6
Intracavernous (penile) injection	52	35.4
Surgical penile implant	2	1.4
Proportion of time erectile difficulties were experienced during masturbation		
0–25% of the time	20	13.6
26–50% of the time	16	10.9
51–75% of the time	17	11.6
76–100% of the time	82	55.8
Missing	12	8.2
Proportion of time erectile difficulties were experienced during sex with a partner		
0–25% of the time	11	7.5
26–50% of the time	16	10.9
51–75% of the time	21	14.3
76–100% of the time	87	59.2
Missing	12	8.2
Proportion for whom ED was reported to prohibit insertive sex	139	94.6
Perceived importance for partner to have penetrative intercourse		
Never	2	1.4
Occasionally	11	7.5
Sometimes	25	17.0
Moderate	34	23.1
Very	63	42.9
Missing	12	8.2
Perceived importance of participant to have penetrative intercourse		
Never	1	0.7
Occasionally	4	2.7
Sometimes	15	10.2
Moderate	30	20.4
Very	85	57.8
Missing	12	8.2
Proportion diagnosed with ED by health care provider	104	70.7
Primary cause of erectile difficulties		
Medical condition (eg, diabetes, heart disease, Peyronie's disease)	20	13.6
Medical procedure (eg, radical prostatectomy, radiation treatment)	92	62.6
Aging	38	25.9
Psychogenic ED (eg, performance anxiety, trauma)	19	12.9
Other (eg, traumatic past relationship, medications)	10	6.8

surgical penile implant (1.4%). Most reported experiencing ED 76–100% of the time when alone (55.8%) or with a partner (59.2%). For 94.6%, the ED was sufficient to prevent penile-insertive sex.

Most participants (57.8%) responded that penetrative intercourse was "*very*" important to them and 42.9% of participants considered penetrative intercourse "very" important to their partner. The most common primary cause for erectile difficulties was "*medical procedure (eg,* radical prostatectomy, radiation treatment*)*" (63.3%) followed by "aging" (27.2%).

Changes in Willingness to Try EPP as More Information was Provided

Using an ANCOVA (Figure 1), wherein partner participation in the study was controlled for as a covariate, there was a significant increase in willingness to try the EPP as information was presented sequentially ($F(2, 270) = 8.315$, $P < .001$). Participant's willingness increased significantly from the first to second information block ($P < .01$) and from the second to the third information block ($P < .001$).

Association Between Study Variables

Correlations amongst the study variables are presented. First we focus on those potentially related to willingness to use an EPP, independent of any information about the EPP presented to them (Table 4). Significant correlates of willingness to use EPP included: younger age ($r = -0.18$, $P < .05$), shorter relationship ($r = -0.17$, $P < .05$), sexual flexibility (as per SexFlex, $r = 0.26$, $P < .001$), and partner's participation in the survey ($r = 0.24$, $P < .01$).

We found several correlations amongst the other study variables. Older age was positively correlated with relationship duration ($r = 0.46$, $P < .01$), and negatively correlated with sexual function (as per SHIM, $r = -0.20$, $P < .05$), perceived importance of having penetrative intercourse to partners ($r = -0.20$, $P < .05$) and patients ($r = -0.25$, $P < .01$). Being a sexual minority was negatively correlated with perceived importance of penetrative intercourse to patients ($r = -0.18$, $P < .05$), whereas sexual function was negatively correlated with sexual distress (as per SDS, $r = -0.29$, $P < .01$) respectively. Partner's participation in the study was correlated negatively with relationship duration ($r = -0.21$, $p < .05$) and positively correlated with sexual flexibility (as per SexFlex, $r = 0.19$, $P < .05$). Sexual distress (as per SDS) was negatively correlated with sexual flexibility ($r = -0.24$, $P < .01$) as well as positively correlated with perceived importance of having penetrative intercourse to partners ($r = 0.40$, $P < .01$) and patients ($r = 0.39$, $P < .01$). Lastly, relationship duration was negatively correlated with sexual function ($r = -0.17$, $P < .05$), whereas perceived importance of penetrative intercourse to partners was positively correlated

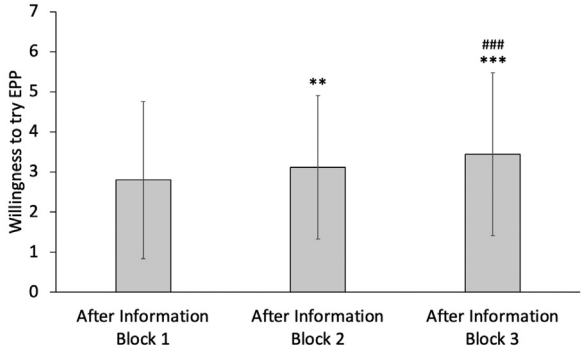

Figure 1. Willingness to try an external penile prosthesis (EPP) at 3 different time points after the sequential information on the EPP. Time period #1 was after the information block 1, when the EPP was introduced as an alternative to ED treatments for sexual intimacy. Time period #2 was after the information block 2, when the biomechanic on how an EPP may be used by a couple for penile-insertive sex was explained. Time period #3 was after the information block 3 where the concept of how multi-sensory integration may occur during penile-insertive sex using an EPP. The willingness increased as more information was provided to participants. Data are presented as means ± standard deviations. **Significantly different from Time period 1, $P < .01$, ***$P < .001$. ###Significantly different from Time period 2, $P < .001$.

with perceived importance of penetrative sex to patients ($r = 0.61$, $P < .01$) respectively.

Association Between Participants Willingness to Try anEPP and Selected Variables

As shown in Table 5, multiple regression analyses showed that sexual flexibility (as per Sexflex) was associated with a greater initial comfort in trying the EPP (B = .10, SE = .04, $P < .01$; F(10, 97) = 2.28, $P < .05$).

Patient Preferences for the Clinical Introduction to an EPP

Table 6 summarizes participants' preference on how an EPP should be introduced. Participants considered the best time to introduce the EPP option to patients was "*only after the man has tried oral medications for erectile difficulties*" (26.5%) or "*before erectile difficulties occur, such as before any medical treatment that may cause erectile difficulties" (*21.1%). Comparatively, when asked about personal preference for when, during the ED treatment trajectory, they would personally prefer to try the EPP, the 2 most common preferences were "*only after oral medications for erectile difficulties have been tried*" (28.6%) and "*only after injectable drugs to treat erectile difficulties have been tried*" (23.1%).

There were comparable preferences among participants for the location of EPP introduction within a medical clinic, ie, "*in a medical clinic, by a physician or nurse"* (27.2%), "*a sexual health therapist or counselor*" (23.8%) and "*outside the clinic or counselling setting"* (21.8%). A similar preference was seen among participants for who they preferred to introduce the EPP option to them, with "*a sexual health therapist or counsellor"* (28.6%) and "*a physician in clinic"* (25.9%) being the top preferences.

As for the preference for the EPP's appearance, 23.8% selected "*it very much doesn't matter/it doesn't matter*" and 23.1% selected "*it matters/it matters a lot*" (Figure 2). In terms of the preferred terminology for the device, the name "external penile prosthesis" had the highest acceptability score. When tested using an ANCOVA and controlling for partner participation in the study, the name "EPP" was significantly preferred [Figure 3, F(2, 358) = 33.7, $P < .001$] over the options: "belted prosthetic phallus" ($P < .001$) and "strap-on dildo" ($P < .001$).

DISCUSSION

Overall, our study reveals a variety of factors that influence the willingness of individuals with ED to try a non-medical alternative to treatments, namely the EPP. The EPP can lead to resumption of partnered insertive sex that may lead to orgasmic sex for partners, despite ED.

Here we found that willingness to try an EPP as an option for penetrative sex increases with the more information provided to them. This suggests that a reason there are few reports of men with ED using an EPP may simply reflect a lack of awareness of this option and how it works. In addition, younger age for the patient, a newer relationship, partner participation in treatment decision and a higher sexual flexibility are positively associated with patients' initial willingness with trying the EPP.

Other factors that may influence willingness to try an EPP relate to the context in which it is introduced. Technically, an EPP is not an ED treatment and, as such, not endorsed (nor even discussed) as a protocol for treating ED.[2,21] However, our data suggest that patients' willingness to try it may be influenced by who tells them about it, when they hear about it, and where they hear about it.

Effect of Education on Willingness to Try an EPP

Our finding of a positive relationship between providing information about how to use the EPP and participants' willingness to use the EPP emphasizes the importance of patient education when presenting a novel strategy for sexual recovery, in this case using an EPP. Our finding is consistent with a previous study on willingness to try ICI for men who have ED after a radical prostatectomy.[22] That study showed that the uptake of ICI is higher for men who were informed about the penile injection prior to having ED, as compared to those who did not receive any a priori information about ED management strategies.

Providing additional information on how using an EPP may potentially lead to orgasmic sex for the wearer of the device, may help patients change their perception and understanding of the EPP. First, it may alleviate the common belief held by

Table 4. Correlation matrix of selected variables and participant willingness to try an EPP before receiving any information about EPP

	Sexual orientation	Partner's participation	Relationship duration	SHIM score	SDS score	SexFlex score	Importance of penetrative intercourse to partners	Importance of penetrative intercourse to patients	Had previous ED treatment (s)	Willingness to try EPP
Age	-.012	-.047	.459†	-.200*	-.057	-.057	-.198*	-.250†	.025	-.182*
Sexual orientation		-.131	-.087	.023	-.061	.011	-.147	-.184*	.039	.043
Partner's participation			-.205*	.072	-.098	.191*	.010	.123	.063	.235**
Relationship duration				-.173*	.087	-.122	-.002	-.056	.098	-.174*
SHIM total score					-.288†	.049	.137	.104	.013	-.012
SDS total score						-.244†	.404†	.385†	-.043	.086
Sexflex total score							-.043	-.034	.044	.258**
Importance of penetrative intercourse to partners								.605†	.119	.075
Importance of penetrative intercourse to patients									.106	.164
Had previous ED treatment (s)										.091

*P <.05.
†P < .01.

Table 5. Linear multiple regression analysis of selected variables with participants' willingness to try an EPP before any additional information about the EPP was presented

Independent variables	Unstandardized coefficient beta	Standard error	*P* value	F	*P* (model)
Age of partner	-.020	.014	.173		
Sexual orientation	.455	.643	.481		
Partner participation in the survey	.697	.390	.077		
Relationship duration	.000	.001	.505		
SHIM total score	-.045	.033	.179		
SDS total score	.046	.054	.397		
Sexflex total score*	.097	.036	.008		
Importance of penetrative intercourse to partners	-.079	.212	.709		
Importance of penetrative intercourse to patients	.185	.271	.497		
Previous uses of ED treatment(s)	.009	.409	.983		
				2.278	.019

*Significant association between independent variable and dependent variable; $P < .01$.

many that, because their own penis is not penetrating their partner, they would be unable to feel sexual pleasure when using the EPP. This was introduced in the second information block, where we discussed how a partner can use their hand to physically stimulate the penis which also protrudes through the harness, while engaging in penetrative intercourse.[14] Additionally, the third information block explained the neurobiological concept of multi-sensory integration that may help to make the sexual experience feel natural to the individual using the EPP for penetrative sex. As a result, participants learned that using an EPP, engages an array of sensations typically experienced during intercourse including pelvic hip movements to recreate the sensations experienced during regular penetrative intercourse.[16] This, with the aid of manual stimulation to the penis by the partner along with sufficient arousal, can culminate in orgasm.[14] Thus, providing scientific background helps patients accept the EPP as a scientifically sound sexual aid rather than as a sex toy with no established therapeutic value. In the same vein, we recommend that health professionals include information on the EPP and the neurobiological basis for its effectiveness when discussing ED treatment options with patients. Presenting this option to patients, who are considering invasive ED treatments, is consistent with the patients making fully informed treatment decisions.

Correlations With Willingness to Try EPP

There are other noteworthy correlations with willingness to try an EPP. Age and relationship duration were both found to be negatively correlated with initial comfort in trying EPP. In our study, older couples also tended to have longer relationship duration. Correlation with age is likely due to age-related decline in sexual function and activities.[23] In particular, as men age testosterone levels decline and this is associated with lower libido. Similarly in women, significant change in estrogen levels during menopause also causes decreased libido and changes in vaginal health (eg, vaginal dryness, discomfort).[24,25] These normal age-related processes could reduce motivation to try penile-insertive sex altogether, and perhaps more so for penile-insertive sex using a prosthesis. Furthermore, older patients may tend to be more conservative and thus more reluctant to use a non-medical sex aid, such as an EPP. As noted in a previous study,[26] older (ie, over 50) men are less likely to have used dildos for sexual activity than younger men in their lifetime.

Additionally partner's participation in the study is also correlated with willingness to try an EPP. This finding has an important relevance for clinicians when offering an EPP to patients. Considering that penetrative sex involves not just the patients, clinicians should also consider involving partners in their discussion when offering an EPP.

Sexual Flexibility Influences Willingness to Try an EPP

From the multiple linear regression analysis, sexual flexibility (ie, a patient's willingness/ability to change their approach when encountering sexual difficulties; measured using the Sexflex scale) was the only significant predictor of patient initial comfort in trying an EPP. Participants high in sexual flexibility are likely more sexually adaptable, are understandably more likely to be comfortable in trying novel sexual practices, like the EPP. Knowing this relationship, clinicians may consider using the 6 item Sexflex questionnaire as a preliminary assessor of patient openness, before introducing the EPP. Additional supportive intervention to help expand patients' sexual flexibility may also be valuable.

Patient Preferences for the Clinical Introduction of the EPP

Timing of the Introduction. Both for themselves and for others, participants suggested that the most appropriate time to introduce the EPP as a treatment option was after oral ED medications had been tried. This timing may reflect the inclination of

Table 6. Preferences regarding clinical introduction of the external penile prosthesis (EPP)

Variables	N	%
Participants' preference for when to introduce an EPP		
Only after the man has tried oral medications for erectile difficulties	39	26.5
Before erectile difficulties occur, such as before any medical treatment that may cause erectile difficulties	31	21.1
As a last resort before going for surgery for a penile implant	30	20.4
The first time the man experiences erectile difficulty	11	7.5
Only after the man has tried injection medications to treat erectile difficulties	6	4.1
Missing	30	20.4
Most preferred setting to introduce an EPP		
In a medical clinic, by a physician or nurse	40	27.2
In a sexual health therapist or counsellor's office	35	23.8
Outside the clinic or counselling setting, such as via a website online or in sex shops	32	21.8
Missing	40	27.2
Most preferred provider to introduce an EPP		
A sexual health therapist or counsellor	42	28.6
A physician in clinic	38	25.9
Health educators, such as patient advocate or patient navigators	11	7.5
Directly from other men or their partners	10	6.8
A nurse in clinic	7	4.8
Missing	39	26.5
Preference for most comfortable timing to try an EPP		
Only after oral medications for erectile difficulties have been tried	42	28.6
Only after injectable drugs to treat erectile difficulties have been tried	34	23.1
The first time erectile difficulty is experienced	11	7.5
Before erectile difficulties occur, such as before any medical treatment that may cause erectile difficulties	12	8.2
Only after a penile implant has been tried, but did not work as effectively as initially hoped	10	6.8
Missing	38	25.9

participants to explore novel non-invasive treatment options first before progressing to invasive options, such as ICI and implants. However, this perspective, we believe, reflects *when* participants prefer to try an EPP rather than when they feel it is best to learn about this option. As noted above, educating patients about treatment options, such as the ICI,[22] before the patients are challenged by ED may help increase the eventual uptake of recommended interventions. Thus, the best timing of introducing the EPP may be earlier on—before patients try other ED therapies.

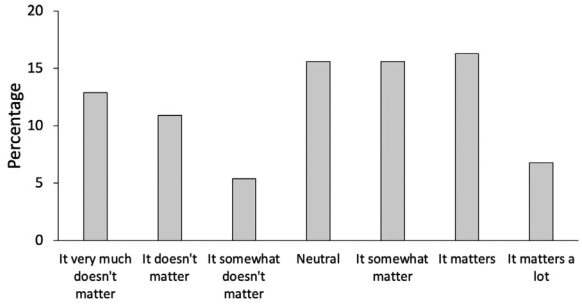

Figure 2. Participant and partner preference for an external penile prosthesis personalized to match in appearance participants' own erect penises. Among the respondents, 29.2% of the participants felt that it didn't matter, if the prosthesis anatomically matched their own erect penis. In contrast, 15.6% were neutral on the topic and the majority, 38.7%, felt that an anatomical match mattered somewhat or a lot.

Those who are more informed about their options might be more willing to try an EPP, if they learn about it early.

Setting and the Person Introducing an EPP. Participants did not show a strong preference for a specific location that they feel is best for introducing the EPP to ED patients. The most appropriate context for introducing the EPP is a medical clinic (25.9%) and sexual health therapist/counsellor's office (24.1%) by sexual health therapist/counsellor (27.2%) or physician (25.3%). Despite the EPP status as a non-medical sex aid, participants still indicated a preference for learning about it in a professional setting by trained healthcare professionals.

EPPs are still novel aids for overcoming sexual dysfunction with limited information in the scientific literature endorsing their use. This is despite EPPs being extensively marketed as sex toys.[27] Few physicians may be aware of EPPs as a way for couples to maintain sexual intimacy nor consider introducing EPPs to

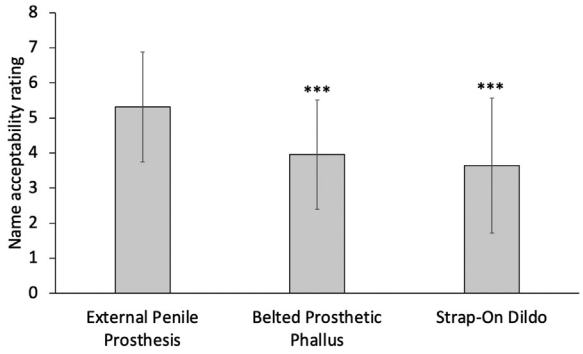

Figure 3. The acceptability of alternative name options for the external penile prosthesis among patients with erectile with dysfunction. An "external penile prosthesis" was preferred over the other 2 options. Data are presented as means ± standard deviations. ***Significantly difference in name acceptability rating, $P < .001$.

their ED patients as part of their scope of practice. Further effort is needed to both investigate EPP efficacy in the real world and inform physicians about this aid for sexual recovery that goes beyond strictly ED treatments. This is relevant because our study shows that there is considerable preference for the EPP being introduced in a medical setting by a qualified healthcare provider. Providers can use this information about patient preferences to guide their introduction of the EPP to patients in their own clinics.[28]

Physical Appearance of an EPP. While a variety of EPPs (eg, various size, shape, color) are widely accessible in both adult and online sex shops, customizable EPP services are also available. More participants prefer personalization of the EPP to match their own penis' physical appearance than not. Having an EPP like the man's previous natural erect penis may allow the patients and their partners to psychologically accept the EPP more easily, as an 'extension' of themselves, rather than a foreign object. This mental transference was observed in Warkentin et al[14] where the patient, through significant acceptance of the dildo as an "organ" rather as an "object," was able to derive sexual pleasure from oral stimulation provided by his partner to his EPP, despite it not being his own penis.[14] Furthermore, partners may also be more comfortable with an EPP of a size they are familiar with and may be apprehensive if the EPP is unlike their partner's normal erect penis in size, shape and color. A customizable EPP reduces the risk of dyspareunia for the partner, by matching in size and shape the penis they are most accustomed too.

Options for customization an EPP are reviewed in Wassersug and Wibowo.[16] Penile casting services allow patients with ED to cast a direct copy of their erect penis, by inducing an erection with ED aids, such as ICI or the VED. However, it is also true that customizing an EPP presents the opportunity for couples to explore smaller or larger sizes as per their preference. Clinicians may support patients and partners by providing information about ideal harnesses and dildos, and also options for EPP customization. Alternatively, a dildo that the couple is comfortable with can be purchased without prescription. Generally, those designed for strap-on use have a flared base to hold them securely in a harness. Some of the available options online include a male orientated strap-on-harness, which allows for the genitals to also be exposed for easier stimulation by the partner. Another option available is an underwear-based harness. The patient can then attach different sized dildos (custom, casted, or store bought) that fit their and their partner's preferences.

Terminology for an EPP. Among the choices we provided for the name of this sex aid, "external penile prosthesis" was found to be strongly preferred (consistent with Warkentin et al[14]). Physicians and other health professionals should feel confident addressing this sexual aid as an "external penile prosthesis" and may find the label most acceptable to patients and partners in the clinical setting.

Strengths and Limitations

Our study has several limitations. Online surveys may be at risk of contamination with fraudulent data. To mitigate this, advertisement for the study was specifically distributed to potential individuals with a high risk of ED, such as prostate cancer support groups and patients seeking treatment in sexual health clinics. Second, to improve our confidence with data quality, responses from redundant IP addresses were removed and only questionnaires that were sufficiently completed were analyzed.

Additional limitations include that ED status was based on self-report only, and participants were somewhat homogenous—largely older, partnered, heterosexual men, who were experiencing physiological ED. Results may be more applicable to same sex couples, as research demonstrates that gay and bisexual men tend to be more open to using sex toys than heterosexual men.[29,30]

Future studies are needed to establish the efficacies as a strategy for sexual recovery in the real world setting and should include investigating both patient and partner comfort with the EPP in both vaginal and anal sex. Because anal penetration requires more penile rigidity than vaginal penetration, using an EPP may overcome limitations from ED treatments that fail to produce erections firm enough for anal penetration.

Finally, our study was at risk of selection bias. Participants who agreed to join the survey may be more health conscious, more comfortable about their sexuality, as well as more bothered by ED than those who did not. Consequently, our findings may not be generalizable to all men with ED. In a recent study, sexual distress was associated with trying more strategies for sexual activities.[12] As such, our population may be over representative of patients experiencing high distress from ED. Our results may thus be biased in favor of willingness to try an EPP, which may not be representative of the larger ED population.

CONCLUSION

In conclusion, our findings suggest that participants have preferences for how an EPP is introduced. For example, most preferred to be introduced to an EPP after they have already tried some treatments for ED, and for it to be introduced by a sexual health therapist/counsellor or physician. In addition, while most did not feel a need to personalize the EPP (eg, in terms of size, color, shape), some respondents did favor that. Participants most likely to be receptive to the EPP include those who were younger and in shorter term relationships, those who involved their partners in deciding to try an EPP, and those who were more flexible in their adjustment to sexual change. In our regression analysis, when all predictors were included, the only significant predictor was sexual flexibility − that is, those high in sexual flexibility reported more willingness to try the EPP.

An EPP may be a viable alternative to ED treatments for restoring penetrative sexual intercourse in the context of ED. Clinicians, including physicians and sex therapists treating

patients distressed by ED, may do well to consider introducing the EPP options within the scope of their clinical practice. We identify strategies for the introduction of the EPP to ED patients that may influence their willingness to explore this option. These include emphasizes the importance of explaining how an EPP can be used to create a pleasurable and rewarding sexual experience for both the wearer of an EPP and the receiving partner.

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STATEMENT OF AUTHORSHIP

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