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## Daily Sexual Behavior, Sexual Esteem, and Body Image in Transgender and Cisgender Individuals

Mathilde Kennis<sup>a,b,c</sup>, Felix Duecker<sup>b,c</sup>, Els Elaut<sup>d,e</sup>, Guy T'Sjoen<sup>e,f</sup>, Tom Loeys<sup>g</sup>, Alexander T. Sack<sup>b,c,h</sup>, and Marieke Dewitte<sup>a</sup> 

<sup>a</sup>Department of Clinical Psychological Science, Maastricht University, Maastricht, Netherlands; <sup>b</sup>Department of Cognitive Neuroscience, Maastricht University, Maastricht, Netherlands; <sup>c</sup>Maastricht Brain Imaging Center, Maastricht, Netherlands; <sup>d</sup>Department of Clinical-Experimental and Health Psychology, Ghent University, Ghent, Belgium; <sup>e</sup>Center for Sexology and Gender, Ghent University Hospital, Ghent, Belgium; <sup>f</sup>Department of Endocrinology, Ghent University Hospital, Ghent, Belgium; <sup>g</sup>Department of Data Analysis, Ghent University, Ghent, Belgium; <sup>h</sup>Center for Integrative Neuroscience, Maastricht University, Maastricht, Netherlands

### ABSTRACT

Multiple surveys have suggested that transgender individuals show lower sexual well-being than cisgender individuals. Most studies, however, are limited in terms of ecological validity and memory bias and cross-sectional in nature. These issues are less prevalent in diary studies monitoring responses over time at home. For three weeks, 47 transgender ( $M$  age = 29.00,  $SD$  = 11.62) and 52 cisgender individuals ( $M$  age = 32.90,  $SD$  = 11.44) reported daily on their sexual behavior, sexual esteem and body image. Using multilevel model analyses, we investigated the daily associations between these variables, and addressed differences between transgender and cisgender individuals. We found that in transgender individuals, intimacy predicted sexual esteem; sexual openness predicted sexual esteem and body image; and sexual esteem predicts intimacy, masturbation, and sexual openness on the daily level. While transgender individuals scored lower on daily sexual esteem and body image than cisgender individuals, groups did not differ in daily sexual behavior. They also did not differ in any of the predictive relations described above, but we did find that the association between masturbation and body image was moderated by a cisgender identity, and sexual esteem predicted sexual activity more positively in cisgender compared to transgender individuals. These results complement findings from cross-sectional studies and indicate how transgender individuals struggling with sexuality can increase sexual openness. Implications for clinical practice are that clinicians discussing sexuality with their transgender patients should not define sexual activity too narrowly, and that sexual esteem might be a relevant factor in determining sexual behavior.

### Introduction

Transgender people experience an incongruence between their experienced and assigned gender, contrary to cisgender individuals. When this incongruence causes significant distress, this experience is referred to as gender incongruence (World Health Organization, 2022). Some transgender individuals might want to alleviate the distress accompanying their gender incongruence by gender affirming medical treatment (GAMT), which often comprises gender affirming hormone therapy and/or surgery (World Professional Association for Transgender Health, 2022). Gender incongruence can potentially affect sexuality and sexual well-being (Elaut & Nieder, in print). For instance, compared to cisgender individuals, transgender individuals have lower sexual esteem (Kennis et al., 2022a) and a higher prevalence of sexual dysfunctions (Kerckhof et al., 2019). These negative sexual outcomes in transgender people have been explained by low body image or body satisfaction (Nikkelen & Kreukels, 2018) and a need for GAMT (Kennis et al., 2022b).

While these scientific findings are valuable for transgender individuals and clinicians working with this population, they all stem from cross-sectional questionnaire studies. Such

studies, especially when conducted in the lab or a clinical setting, have their shortcomings in terms of ecological validity, memory bias, and their ability to reveal temporal interrelations between study variables (Bolger et al., 2003; Laurenceau & Bolger, 2005). Given that sexual experiences are variable and context-dependent (Dewitte et al., 2015), we need to move beyond questionnaire studies that provide only a snapshot of sexual responding. Diary study methods, in which participants provide repeated data entries on consecutive days, are well suited for this purpose, and have become increasingly popular in the field of sex research. By applying this method, researchers have been able to investigate how sexuality and sexual well-being relates to a great variety of variables (e.g., mood, Dewitte et al., 2015; dyadic sexual desire discrepancies, Jodouin et al., 2021; fatigue, Tan, 2021; oral contraceptives, Elaut et al., 2016), and they have done so in various populations (e.g., college students, Ford et al., 2021; newlywed couples, Gadassi et al., 2016; women with pelvic pain, Glowacka et al., 2019; men who have sex with men, Sarno et al., 2017). To our knowledge, transgender individuals have not been included in diary studies so far.

**CONTACT** Mathilde Kennis  [mathilde.kennis@maastrichtuniversity.nl](mailto:mathilde.kennis@maastrichtuniversity.nl)  Department of Clinical Psychological Science, Faculty of Psychology and Neuroscience, Maastricht University, Oxfordlaan 55, Maastricht 6229 EV, The Netherlands

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In order to start mapping a more ecologically valid picture of sexuality in transgender individuals, and to investigate how variables might influence each other from day to day, we conducted a first explorative diary study in transgender and cisgender men and women. We investigated how variables related to sexual esteem and body image affect sexual behavior and vice versa. While this study was explorative in nature, we selected these variables based on their conceptual relevance for a transgender population. For instance, sexual esteem (a person's self-evaluation of worth as a sexual being) has been shown to be lower in transgender compared to cisgender individuals (Kennis et al., 2022a), related to gender dysphoria in transgender individuals (Kennis et al., 2022a), and lower in transgender individuals with an unfulfilled compared to a fulfilled treatment desire (Nikkelen & Kreukels, 2018). Similarly, body image has been shown to be lower in transgender individuals (transgender men in this case) compared to cisgender individuals, and to improve after GAMT (van de Grift et al., 2016). Furthermore, issues related to body satisfaction and sexual esteem often emerge in qualitative studies, where transgender individuals describe which factors affect their sexual well-being (Lindley et al., 2021; Lindley et al., 2020; Martin & Coolhart, 2022).

Because “sex” and “sexual behavior” have different meanings for different people, we make a distinction between sexual activity, intimate activity, masturbation, and sexual openness. In this study, sexual activity was defined as activities that include genital touching, e.g., oral sex. Intimate activity is defined as activities that include (non-genital) touching such as kissing, caressing and cuddling. Masturbation is defined as solitary genital touching. Finally, we included self-reported sexual openness (the degree to which participants report to be open to engage in sexual activity), since an absence of sexual activity does not necessarily mean that the individual had no desire for this; it might have been that, for instance, there was no partner available or that other circumstances precluded sexual activity. We investigated how these sexual behaviors affect sexual esteem and body image from day to day, and how sexual esteem and body image in their turn affect sexual behavior. Finally, we also investigated whether and how these relations differ between transgender and cisgender individuals. For instance, it could be that while sexual activity predicts a more positive body image in cisgender individuals (Woertman & van den Brink, 2012), there is no such association for transgender individuals because sexual activity might actually elicit gender dysphoria (Lindley et al., 2020).

## Method

### Participants

All participants were required to be at least 18 years old, have a binary gender identity, and be fluent in Dutch. There were no criteria with regards to sexual orientation or partner availability/relationship status. Furthermore, participants were required to have access to a smartphone in order to install the app presenting the questionnaires.

Transgender participants were mainly recruited via the Center for Sexology and Gender at Ghent University Hospital, Belgium, as well as via social media advertisements

in channels directed toward the transgender community in the Netherlands and Belgium. In total, 56 transgender individuals enrolled in the study. Seven participants encountered technical issues, and two completed less than 50% of the daily questionnaires and were hence dropped from the analyses, resulting in a final sample of 47 transgender participants.

After the transgender sample was recruited, Dutch panel organization Flycatcher recruited cisgender participants. Of the 6137 respondents they reached, 1761 fit the criteria and expressed interest in participating after receiving preliminary info about the study. Of this group, a sample of 186 cisgender individuals similar to the transgender sample in terms of gender, age, occupation, and educational level was contacted with more information about the study. Of this group, 63 individuals enrolled in the study, of which eleven had to drop out due to technical issues, resulting in a final sample of 52 cisgender participants. Participants that were excluded due to technical or drop-out reasons did not differ from included participants on sociodemographic variables such as age, educational level, occupation, living situation, or group (cis woman vs. cis man vs. trans woman vs. trans man).

### Procedure

After having read an information letter, all participants gave informed consent and completed a pre-questionnaire via Qualtrics. Afterward, they installed the application mEMA, which was developed for the assessment of daily questionnaires and experience sampling methods (mEMA; ilumivu, Inc., Cambridge, MA; [www.ilumivu.com](http://www.ilumivu.com)). Participants were instructed to indicate a three-week period during which their life would be relatively “regular,” i.e., during which they would not be on a holiday, receiving surgery, or something similarly breaking routine. During this three-week period, which always started on a Monday and ended on a Sunday, participants received a daily morning and evening questionnaire. After completing the study, participants received a debriefing and €30 as reimbursement.

The study protocol was approved by the Commission for Medical Ethics at Ghent University Hospital [approval code: 2019/0652] and the Ethical Review Committee Psychology and Neuroscience at Maastricht University [approval code: 204\_10\_02\_2019]. Participants were made aware that they could discontinue their participation any time without any repercussions. All study data was collected between July 2019 and November 2021.

### Measures

#### Pre-questionnaire

Participants completed single items on age, educational level, occupation, number of children, relationship status and duration, and housing.

Sex assigned at birth was assessed via a multiple choice question, presenting “Male” and “Female” as response options. Gender identity was assessed using a multiple choice question, presenting “(Trans) man,” “(Trans) woman,” “Genderqueer/polygender/agender/gender fluid/non-binary,” and “I do not know, I have no preference”

as response options. The last two were selected by none of our participants, since they were recruited to have a binary gender identity. We grouped participants according to their responses on the questions about sex assigned at birth and gender identity: those who selected “Male” and “Man” were considered cisgender men; those who selected “Male” and “Woman” respectively were considered transgender women; those who selected “Female” and “Woman” were considered cisgender women; and those who selected “Female” and “Man” were considered transgender men. Sexual orientation was assessed using two scales on which participants could indicate their attraction toward men and women, ranging from 0 (“Not at all attracted”) to 100 (“Extremely attracted”).

Transgender participants were presented with a questionnaire on GAMT, inquiring whether they had received/undergone gender affirming hormone treatment (GAHT) and/or gender affirming surgery (GAS) and how long ago this was; how satisfied they were with these procedures if so; and whether they were planning to undergo (further) GAMT.

### Daily Questionnaires

We mostly duplicated the questionnaire design from Dewitte et al. (2015). Morning questionnaires were accessible for participants between 08:00 and 13:00. As a measure of sexual openness, participants were asked to indicate how open they would have been to engage in sexual activity in case the opportunity would have occurred on a scale from 1 (“Not at all”) to 7 (“Very much”). They also indicated whether they had masturbated, had engaged in intimacy, and had had sexual activity via Yes/No questions. The difference between intimate and sexual activities was clearly indicated by providing a specific definition of intimacy as entailing cuddling, caressing, and kissing, and sexual activity as entailing genital touching.

Evening questionnaires were accessible for participants between 20:00 and midnight. As a measure of daily sexual esteem, participants rated five positive (e.g., “Today I felt sexy”) and four negative (e.g., “Today I felt like a disappointment in bed”) items on a scale ranging from 1 (“Not at all”) to 7 (“Extremely”). After reverse scoring the negative items, all items were averaged to obtain a score on daily sexual esteem, with higher scores indicating higher esteem (Cronbach’s  $\alpha = .88$ ). As a measure of body image, participants were presented with three items (e.g., “To what extent were you satisfied with your body today?”) which were to be rated on a scale from 1 (“Not at all”) to 7 (“Very much”), which were averaged to obtain the measure. Higher scores indicate higher body image (Cronbach’s  $\alpha = .73$ ).

### Questionnaires Excluded from the Current Analyses

As part of the pre-questionnaire, participants completed measures on general and mental well-being, sexual esteem and sexual pre-occupation, and genital self-image. During the morning questionnaires, participants were presented with follow-up questions on their reasons for (not) engaging in sexual activity, and how they felt during intimate and sexual activities. During the evening questionnaires, they also completed items about stress, mood, and self-concept discrepancies. The data

related to these questionnaires and items are not included in this manuscript and will be reported elsewhere.

### Analyses

Descriptive statistical analyses were performed using the software JASP (JASP Team, 2020). Group differences were analyzed using independent-samples t-tests in the case of continuous variables, and chi-square tests of independence in the case of categorical variables.

The diary data analysis included a total of 3772 observations (which is 90.76% of the total potential 4156 observations). Multilevel model analyses were performed using R (v. 4.1.2, R Foundation of Statistical Computing) using the *lme4* package (Bates et al., 2015). The scores of the daily outcome variables (sexual esteem, body image, sexual activity, intimate activity, masturbation, and sexual openness) were group-mean centered to determine the within-subjects (level 1) effects, and means of the participants’ daily scores were used as between-subjects (level 2) effects when used as predictors. We investigated whether evening variables (sexual esteem and body image) would predict morning variables (sexual activity, intimate activity, masturbation, and sexual openness), and vice versa. Multilevel linear regression models were fitted to predict continuous variables (sexual esteem, body image, sexual openness), and multilevel logistic regression models were fitted to predict variables with binary outcomes (sexual activity, intimate activity, masturbation; all coded “Yes” = 1 and “No” = 0). We estimated  $\beta$  coefficients reflecting the predictive effect of all predictor variables on both the within- (level 1) and between-subjects (level 2) level, while investigating the main effects of (and controlling for) having a cisgender or transgender identity, and relationship status. Interaction terms were included in the same models to investigate whether the relationships between variables differed between transgender and cisgender participants. Given the explorative nature of this study, a separate model was fitted for each outcome variable, and we applied a significance threshold of  $p = .05$  for every analysis.

### Results

#### Demographics, Transition Status, and Study Compliance

The sample included 29 transgender men (TM), 18 transgender women (TW), 27 cisgender men (CM), and 25 cisgender women (CW). Participants’ age ranged between 18 and 65 years old, with  $M = 31.05$  and  $SD = 11.64$ , and no difference between transgender and cisgender participants ( $t(97) = 1.68$ ,  $p = .096$ , Cohen’s  $d = .339$ ). Participant characteristics on education, occupation, housing, and number of children are presented in Table 1, which indicates no differences between transgender and cisgender participants on any of these variables. Fifty participants (51%) had a relationship during the study period (with no differences in relationship status between transgender and cisgender participants;  $X^2(1, N = 99) = 2.26$ ,  $p = .132$ ,  $\phi = .151$ ), with most participants indicating that their relationship had a duration of 2 to 5 years (30%) or more than 5 years (42%). In terms of sexual

**Table 1.** Participant characteristics and group differences on education, occupation, housing, and number of children.

		Transgender group	Cisgender group	Group difference
Education	No high school	1 (2%)	0 (0%)	$\chi^2(1, N = 99) = 2.12, p = .347$ , Cramer's $V = .146$
	High school degree	21 (45%)	29 (56%)	
	College or university degree	25 (53%)	23 (44%)	
Occupation	Student	18 (38%)	13 (25%)	$\chi^2(1, N = 99) = 2.09, p = .352$ , Cramer's $V = .145$
	Employed	17 (36%)	24 (46%)	
	Unemployed	12 (26%)	15 (29%)	
Housing	Alone	16 (34%)	19 (37%)	$\chi^2(1, N = 99) = 5.07, p = .166$ , Cramer's $V = .226$
	Parents/family	13 (28%)	20 (38%)	
	Partner	12 (26%)	12 (23%)	
	Friends/student housing	6 (13%)	1 (2%)	
Number of children	0	38 (81%)	39 (75%)	$\chi^2(1, N = 99) = 1.77, p = .779$ , Cramer's $V = .134$
	1	3 (6%)	3 (6%)	
	2	2 (4%)	6 (12%)	
	3	3 (6%)	3 (6%)	
	4	1 (2%)	1 (2%)	

**Table 2.** Descriptive statistics on study variables.

	Transgender group $M$ ( $SD$ ), range, skewness, kurtosis	Cisgender group $M$ ( $SD$ ), range, skewness, kurtosis
Sexual esteem	4.25 (1.17), 1.28–6.38, –.20, –.01	4.83 (1.11), 1.84–7.03, –.45
Body image	4.68 (1.36), 1.03–6.75, –.71, .26	5.38 (1.30), 1.46–7.00, –.88, .54
Sexual openness	3.15 (1.34), 1.00–6.19, .36, –.17	3.70 (1.57), 1.00–6.90, .19, –.76
	%	%
Sexual activity	10	16
Intimate activity	30	34
Masturbation	38	31

$M$  = mean,  $SD$  = standard deviation. Percentages present the percentage of days on which sexual behavior was reported.

orientation, the four groups (TM, TW, CM, and CW) did differ on how high they rated their attraction to men ( $F(99,3) = 12.70, p < .001, \eta^2 = .288$ ) and women ( $F(99,3) = 9.56, p < .001, \eta^2 = .236$ ), with post-hoc tests showing that CW scored higher on attraction to men and lower on attraction to women compared to the three other groups ( $p < .005$ ), with no other pairwise differences.

Twenty-nine (62%) of the transgender participants were receiving GAHT, for an average of 40.76 months ( $SD = 24.78$ ). Only four of the TW (24%) had received some form of GAS, and 17 of the TM (61%) had received some form of GAS (mostly mastectomy, by 57% of the TM).

Participants showed high compliance by having completed 38.03 of 42 daily questionnaires on average ( $SD = 3.77$ ), with no differences between transgender and cisgender participants ( $t(97) = 0.55, p = .580$ , Cohen's  $d = .112$ ). Table 2 presents group averages on the study variables.

### **Influence of Sexual Behavior and Sexual Openness on Sexual Esteem and Body Image on a Daily Level**

Table 3 presents the outcomes of the linear mixed models fitted to assess the day-to-day relations between sexual behavior and openness and sexual esteem and body image, and to investigate differences between the transgender and cisgender groups in these relations.

The analyses showed that at average levels of sexual behavior and sexual openness, the mean differences between transgender and cisgender participants on sexual esteem ( $\beta = 1.21, SE = 0.45, t(88) = 2.67, p = .009$ ) and body image ( $\beta = 1.64, SE = 0.70, t(85) = 2.34, p = .022$ ) were statistically significant, with cisgender participants scoring higher. Furthermore, in transgender participants, having had intimate activity on a given day positively predicted sexual esteem ( $\beta = 0.21, SE = 0.08, t(1606) = 2.51,$

**Table 3.** Multilevel coefficients ( $\beta$ ) and standard errors (SE) representing the effects of sexual behavior and sexual openness on sexual esteem and body image on a within- (i.e. daily) and between-subject level.

Predictor	Sexual esteem $\beta$ (SE)		Body image $\beta$ (SE)	
	Within	Between	Within	Between
Cisgender versus transgender identity		1.21 (.45) **		1.64 (.70) *
Relationship versus single		.42 (.23)		–.42 (.37)
	Main effects			
Sexual activity	.03 (.10)	–1.04 (.96)	.03 (.10)	–1.38 (1.46)
Intimacy	.21 (.08)*	.89 (.49)	.07 (.09)	1.64 (.75)
Masturbation	–.07 (.06)	.21 (.51)	.10 (.07)	.28 (.78)
Sexual openness	.12 (.02) ***	.68 (.12) ***	.06 (.02) **	.51 (.18) **
Cis x Sexual activity	.16 (.13)	1.52 (1.43)	–.12 (.15)	1.50 (2.17)
Cis x Intimacy	–.16 (.12)	–1.00 (.67)	.08 (.13)	–.94 (1.03)
Cis x Masturbation	–.01 (.09)	–.59 (.71)	–.21 (.09) *	–.82 (1.10)
Cis x Sexual openness	–.01 (.03)	–.20 (.15)	–.01 (.03)	–.20 (.24)

\*\*\* =  $p < .001$ ; \*\* =  $p < .01$ ; \* =  $p < .05$ .

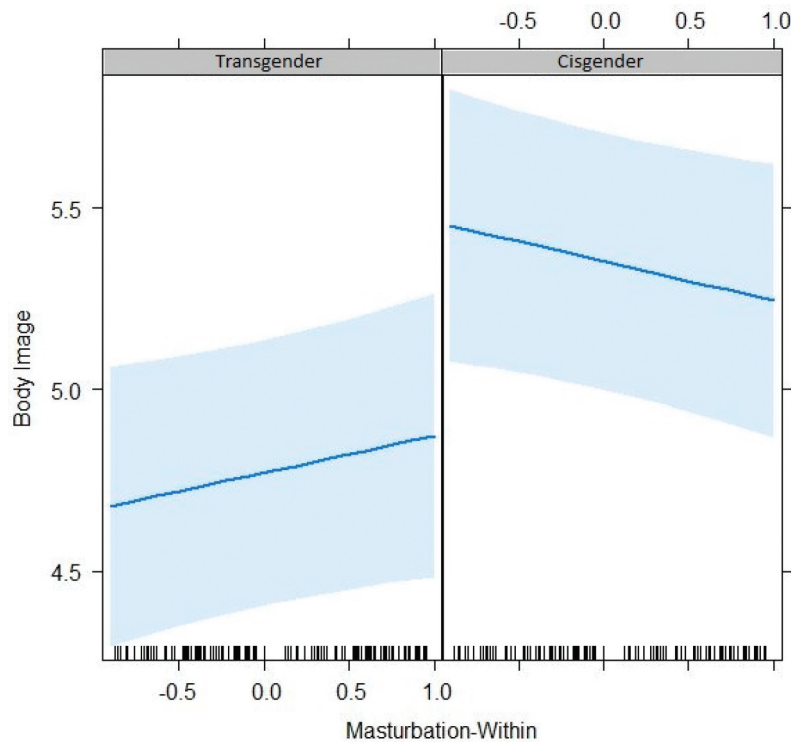
$p = .012$ ). Additionally, in transgender participants, sexual openness positively predicted sexual esteem on the within- ( $\beta = 0.12, SE = 0.02, t(1606) = 5.68, p < .001$ ) and between-subjects level ( $\beta = 0.68, SE = 0.12, t(1606) = 5.76, p < .001$ ). Similarly, sexual openness positively predicted body image on the within- ( $\beta = 0.06, SE = 0.02, t(1508) = 2.71, p = .007$ ) and between-subjects level ( $\beta = 0.51, SE = 0.18, t(85) = 2.84, p = .006$ ) in the transgender group.

As Table 3 indicates, none of these relations differed between the transgender and cisgender groups. However, in the cisgender group, the daily effect of having masturbated on body image was significantly different ( $\beta = -0.21, SE = 0.09, t(1508) = -2.23, p = .026$ ) compared to the transgender group (Figure 1).

To summarize, intimate activity positively predicted sexual esteem on a daily level, and this is the case in both transgender and cisgender participants. Similarly, the groups did not differ in how sexual openness positively predicted both sexual esteem and body image on a daily level.

**Influence of Sexual Esteem and Body Image on Sexual Behavior and Sexual Openness on a Daily Level**

Table 4 presents the results of the (generalized) linear mixed models assessing the influence of sexual esteem and body image on sexual behavior and sexual openness. In transgender participants, having a relationship was related to more sexual activity ( $\beta = 1.69, SE = 0.41, z = 4.13,$



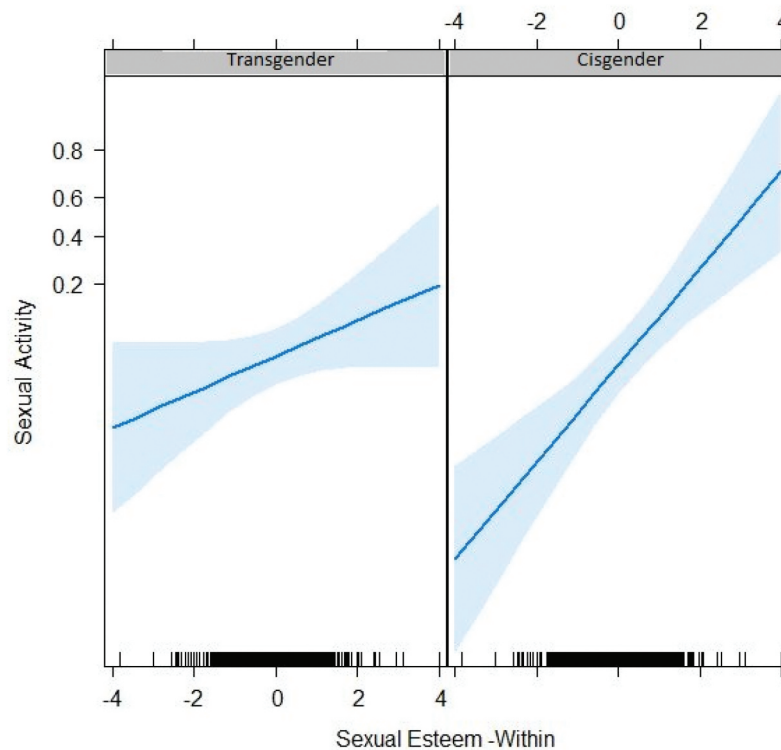
**Figure 1.** The daily effect of having masturbated or not (on the x-axis; values represent subject-centered values) on body image (on the y-axis) differed significantly between transgender (left panel) and cisgender (right panel) participants ( $\beta = -0.21, SE = 0.09, t(1508) = -2.23, p = .026$ ). Shadings indicate 95% confidence intervals. Note that while the figure suggests there is a positive effect in transgender individuals and a negative effect in cisgender individuals, none of these effects in themselves were significant, and only the interaction reached a significance of  $p < .05$ .

**Table 4.** Multilevel coefficients ( $\beta$ ) and standard errors (SE) representing the effects of sexual esteem and body image on sexual behavior and sexual openness on a within – (i.e. daily) and between-subject level.

Predictor	Sexual activity $\beta$ (SE)		Intimacy $\beta$ (SE)		Masturbation $\beta$ (SE)		Sexual openness $\beta$ (SE)	
	Within	Between	Within	Between	Within	Between	Within	Between
Cisgender versus transgender identity	Main effects							
Relationship versus single	-1.12 (1.68)		-.30 (1.79)		2.56 (1.59)		-.48 (.96)	
	1.69 (.41) ***		4.10 (.46) ***		-1.10 (.37) **		-.58 (.23) **	
Sexual esteem	.37 (.21)	.10 (.30)	.75 (.19) ***	-.27 (.32)	.42 (.16) **	.99 (.28) ***	.55 (.08) ***	.90 (.17) ***
Body image	.20 (.20)	.24 (.27)	.05 (.17)	.66 (.27) *	.03 (.14)	.06 (.24)	-.01 (.07)	-.07 (.15)
Cis x Sexual esteem	.63 (.30) *	.34 (.45)	.17 (.27)	.45 (.47)	-.15 (.22)	-.24 (.40)	-.04 (.11)	.27 (.25)
Cis x Body image	.12 (.30)	-.12 (.40)	.28 (.25)	-.50 (.42)	-.03 (.22)	-.41 (.36)	.19 (.11)	-.12 (.22)

\*\*\* =  $p < .001$ ; \*\* =  $p < .01$ ; \* =  $p < .05$ .

Note: Since multilevel logistic regression models are used to predict sexual activity, intimacy, and masturbation, the estimated regression coefficients reported for these variables should be interpreted on the log odds ratio scale. A positive (negative) coefficient corresponds to a higher (lower) probability for the event of interest.



**Figure 2.** The daily effect between sexual esteem (on the x-axis; values represent subject-centered values) and the chance of engaging in sexual activity (on the y-axis; values represented on a logit scale) differed significantly between transgender (left panel) and cisgender (right panel) participants ( $\beta = 0.63$ ,  $SE = 0.30$ ,  $z = 2.11$ ,  $p = .035$ ). Shadings indicate 95% confidence intervals. Note that the positive effect of daily sexual esteem on the chances of engaging in sexual activity was significant in cisgender participants only.

$p < .001$ ) and intimate activity ( $\beta = 4.10$ ,  $SE = 0.46$ ,  $z = 8.94$ ,  $p < .001$ ), and to less masturbation ( $\beta = -1.10$ ,  $SE = 0.37$ ,  $z = -2.96$ ,  $p = .003$ ) and lower sexual openness ( $\beta = -0.58$ ,  $SE = 0.23$ ,  $t(89) = -2.50$ ,  $p = .015$ ). On a daily level, sexual esteem positively predicted intimate activity ( $\beta = 0.75$ ,  $SE = 0.19$ ,  $z = 4.01$ ,  $p < .001$ ), masturbation ( $\beta = 0.42$ ,  $SE = 0.16$ ,  $z = 2.65$ ,  $p = .008$ ) and sexual openness ( $\beta = 0.55$ ,  $SE = 0.08$ ,  $t(1440) = 7.08$ ,  $p < .001$ ) in transgender participants. This effect was also found on a between-subjects level for masturbation ( $\beta = 0.99$ ,  $SE = 0.28$ ,  $z = 43.50$ ,  $p < .001$ ) and sexual openness ( $\beta = 0.90$ ,  $SE = 0.17$ ,  $t(88) = 5.25$ ,  $p < .001$ ). Body image did not predict any of the sexual behavior and openness variables on the daily level, but positively predicted intimate activity on a between-subjects level ( $\beta = 0.66$ ,  $SE = 0.27$ ,  $z = 2.43$ ,  $p = .015$ ).

None of these relationships differed between transgender and cisgender participants, except for the relation between sexual esteem and sexual activity. Here, in cisgender individuals, there was a significantly larger positive influence of sexual esteem on sexual activity on the daily level ( $\beta = 0.63$ ,  $SE = 0.30$ ,  $z = 2.11$ ,  $p = .035$ ; Figure 2).

In sum, in both transgender and cisgender participants, higher sexual esteem on a given day predicted they were more likely to engage in intimate activity or masturbation, and to report higher sexual openness later on. In cisgender (but not transgender) participants, sexual esteem also positively predicted sexual activity on the daily level. Body image, on the other hand, did not play a role in sexual behavior and openness on the daily level.

## Discussion

In this study, we applied a 21-day diary study method to investigate the association between sexual esteem, body image, and sexual behavior in transgender and cisgender individuals. We found that transgender individuals scored lower on daily sexual esteem and body image than cisgender individuals, but the groups did not differ in levels of sexual activity, intimate activity, masturbation, or sexual openness. We also showed that having intimate activity positively predicted sexual esteem on a daily level, and that being more open to engage in sexual behavior is related to higher sexual esteem and body image. Sexual esteem positively predicted intimate activity, masturbation, and sexual openness, whereas body image did not predict any of the sexual behavior variables. Interestingly, sexual activity (defined as genital touching) did not relate to either sexual esteem or body image. Most of these day-to-day relations were similar in the transgender and cisgender groups, with the only difference being that masturbation predicted body image significantly differently, and that sexual esteem positively predicted sexual activity in the cisgender but not the transgender group.

### Day-to-day Associations between Psychological Variables and Sexual Behavior in Transgender Individuals

Given that sexual esteem (Kennis et al., 2022a; Nikkelen & Kreukels, 2018) and body image (Mofradidoost & Abolghasemi, 2020; van de Grift et al., 2016) are considered

relevant concepts in the lives of transgender people, we investigated how these variables predict sexual behavior on a day-to-day basis and how (engaging in or being open to) sexual behavior contribute to self-esteem and body image. While a more positive body image has been associated with more sexual activity in various studies (see Gillen & Markey, 2019, for a review), we did not find this relation in our study. On a within-subjects level, body image did not predict any of the sexual behavior variables in the transgender group, and this was not different in the cisgender group. This suggests that participants' choices on whether to engage in sexual activity, intimate activity, or masturbation were not directly associated with body image, regardless of having a transgender or cisgender identity. The fact that body image did not predict sexual openness either, provides further support for this, since this variable is less likely to be influenced by contextual factors (such as no partner being available or physical constraints).

This inconsistency with previous findings is likely related to the fact that we applied a longitudinal, within-subjects design, whereas most previous studies applied cross-sectional, between-subject designs (Gillen & Markey, 2019). Indeed, on the between-subject level, we did find an association between body image and intimate activity, indicating that individuals with higher body image are more likely to engage in intimate activity in general. This between-subjects finding suggests that improving one's body image might be a means of increasing intimate or sexual activity; however, our within-subjects results suggest that this is not the case. This inconsistency illustrates how complementing cross-sectional findings with results from diary studies can contribute to a better understanding of which variables might have a possible causal influence on sexual responding.

Interestingly, we found no day-to-day associations between sexual activity and masturbation on sexual esteem and body image, while we did find predictive effects of sexual openness (on both psychological variables) and intimate activity (on sexual esteem). This emphasizes the relevance of defining sexual behavior as more than just one sexual act (Dewitte et al., 2015), especially since for some transgender individuals sexual satisfaction can also constitute not having (genital-related) sex (Lindley et al., 2021).

### ***Differences between Transgender and Cisgender Individuals***

In our sample, we found lower daily sexual esteem and body image in transgender individuals compared to cisgender individuals. This is in line with previous findings such as Mofradidoost and Abolghasemi's study (Mofradidoost & Abolghasemi, 2020), which reported lower body image, and Kennis et al. (2022a), who reported lower sexual esteem in transgender individuals compared to cisgender individuals. The fact that our findings are in line with these cross-sectional questionnaire studies further supports their conclusions, as this diary study method reduces the likelihood of retrospection influencing the results. Since participants' reports are closer in time to their actual experience, they are less likely to rely on the peak-end rule, in which participants grant more weight to the most intense and most recent experiences in a certain time frame (Bolger et al., 2003).

Transgender and cisgender individuals did not differ in the proportion of days on which they reported sexual activity, intimate activity, or masturbation, and they did not differ on their daily levels of sexual openness. For all these variables, relationship status was a more important factor, with individuals in a relationship reporting more sexual and intimate activity but less masturbation and lower sexual openness than single individuals.

In terms of within-subject associations between variables, transgender and cisgender individuals showed very little differences in how psychological variables on a given day predict sexual activity, and vice versa. The only significant differences in our models were related to the daily association between masturbation and body image, which was significantly different between cisgender and transgender participants, and the daily association between sexual esteem and sexual activity, which was absent in transgender participants but positive in cisgender participants. The latter is interesting because sexual esteem positively predicted all other sexual behavior components (intimate activity, masturbation, and sexual openness) in both groups, whereas it affected sexual activity only in the cisgender sample. This suggests that while sexual esteem is strongly associated with most components of sexual behavior, it does not explain actual genital sexual activity in transgender individuals. It is likely that there is another variable more closely related to sexual activity on the daily level, such as gender dysphoria, perceived partner support, or partner desire.

### ***Clinical Implications***

Given that body dysphoria is one of the core elements of gender dysphoria (van de Grift et al., 2017), body image is a strong focus in the literature regarding transgender experiences (e.g., Mofradidoost & Abolghasemi, 2020; van de Grift et al., 2016), and the concept has been described as an important factor when supporting sexuality in transgender individuals (Holmberg et al., 2019). In qualitative studies addressing sexual experiences of transgender people, topics related to body image and body dysphoria are some of the most important themes described by participants (Lindley et al., 2021; Lindley et al., 2020; Martin & Coolhart, 2022). Our study, however, suggests that when it comes to explaining sexual behavior, body image might not be as important as suggested. We found that body image had no daily predictive effect on any of the sexual behavior components on the within-subject level. This is in line with one of the few quantitative studies to address the link between body image and sexuality in transgender individuals (Garz et al., 2021), in which it was reported that body image was not related to sexual desire. The authors suggested that for transgender individuals, satisfaction with gender-specific body parts specifically is central to their sexual desire. Body image in the more general sense (as measured in our study and Garz et al., 2021), on the other hand, might not play an important role given the strong focus on secondary sex characteristics.

Hypoactive sexual desire has been described as a common sexual problem in transgender individuals, especially transgender women (Defreyne et al., 2021; Elaut et al., 2008; Kerckhof et al., 2019). Our study suggests that instead of focusing on body image, clinicians working with transgender individuals who want to

increase their sexual openness and sexual activity levels should focus on sexual esteem instead. Furthermore, our results suggest that this can be achieved by encouraging people to engage in intimate activity, as this was found to positively predict sexual esteem, which then in turn positively predicted sexual openness and feeds back into intimate activity in a circular way.

Finally, sexual activity is often considered as an indicator of “treatment success” following gender affirming medical treatment (e.g., Constantino et al., 2013; Klein & Gorzalka, 2009; Wierckx et al., 2011). In most studies, sexual activity is often narrowly defined as penetrative sex or partnered sex involving the genitals. However, contrary to intimate activity, masturbation, and sexual openness, we found that sexual activity was not related to any of the psychological variables on the daily level in our study, indicating that if we would have used a narrow definition of sexual activity, most effects would have remained undetected. As previously suggested (Dewitte et al., 2015), this indicates that both researchers and clinicians should aim to define sexual behavior broadly when describing sexuality in transgender or cisgender individuals, in order to fully capture their experiences and all associations with relevant outcome variables.

### Limitations

While this is the first diary study assessing sexuality in a group of binary transgender individuals, the study had several limitations. An issue inherent to longitudinal studies with daily assessments over multiple weeks is the high participant commitment and dedication (Bolger et al., 2003), posing a high risk of drop-out. However, our daily questionnaires were very brief, and we believe the high compliance rates reflect good participant commitment, which we also sensed in our contact with participants when debriefing them. Secondly, we included only binary identifying transgender and cisgender participants, excluding individuals with non-binary or genderqueer gender identities. Furthermore, the transgender sample was very heterogeneous in terms of GAMT, with some individuals receiving hormone therapy for several years already, and others none at all. Unfortunately, we did not have sufficient power to test statistical differences between these groups. Additionally, we did not include partners and partner effects in this study, while partner variables have been shown to be important in explaining daily sexual behavior (Dewitte et al., 2015), and factors such as the partner’s gender might influence the outcomes. Furthermore, we did not include a measure to address social desirability bias in response to the questionnaires, while such a bias is not uncommon in sexuality research (King, 2022). Another limitation is that transgender and cisgender participants were not matched on sexual orientation and partner status, since cisgender participants were recruited via a research panel. However, the groups did not differ in partner status, and hardly differed in sexual orientation. Finally, even though within-subject effects give more insight into what could possibly be causal relations compared to between-subject effects, all significant predictive effects in this study were based on associations, warranting reservations in considering them causal.

### Future Directions

Future diary study designs assessing sexual behavior in transgender individuals should include non-binary identifying individuals and participants from cultures other than Belgium and the Netherlands to improve generalizability of our results. Furthermore, by increasing sample size, future studies could investigate differences between transgender individuals based on the GAMT they receive. Finally, in order to confirm whether the associations found in this study are causal, studies applying an experimental design could shed light on if and how transgender individuals who, for instance, want to increase their sexual openness can do so via engaging in more intimate activities.

### Conclusion

On a daily level, transgender individuals showed lower sexual esteem and a more negative body image than cisgender individuals, but they did not differ in sexual behavior as displayed in a daily context. In transgender individuals, intimacy predicted sexual esteem; sexual openness predicted sexual esteem and body image; and sexual esteem predicted intimacy, masturbation, and sexual openness on a daily level. None of these daily associations were different in cisgender individuals, contrary to the association between masturbation and body image, which was significantly different, and the association between sexual esteem and sexual activity, which was positive in cisgender but not transgender individuals. These findings indicate that sexual esteem is a more important determinant of sexual behavior than body image in transgender individuals, and that improving sexual esteem might be a possible target to improve sexual openness in this group.

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### ORCID

Marieke Dewitte  <http://orcid.org/0000-0001-7265-8715>

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